DOES NOT CIRCULATE

UNIVERSITY OF MICHIGAN
AUG 2 - 1954
MEDICAL LIBRARY

Journal of the History of Medicine and Allied Sciences

CONTENTS

PIPERNO, TRILUSSA, AND DENTAL CARICATURE, *Dorothy M. Schullian* 273

THE DISCOVERY OF INSULIN, *Joseph H. Pratt* 281

VARIANTS TO THE GERM THEORY OF DISEASE, *Phyllis Allen Richmond* 290

THE CURIOUS OBSCURITY OF DR. JAMES LIND, *A. P. Meiklejohn* 304

HELM ON HUMAN DIGESTION, *Bruno Kisch* 311

CONTRIBUTION OF NEUROLOGY TO VIGNY'S SCEPTICISM, *Irving Massey* 329

AMERICAN ASSOCIATION OF THE HISTORY OF MEDICINE. Abstracts of Papers, New Haven Meeting 349

NOTES AND QUERIES 360

BOOK REVIEWS 374

OLUME IX JULY 1954 NUMBER 3

PUBLISHED QUARTERLY FROM THE
DEPARTMENT OF THE HISTORY OF MEDICINE,
YALE UNIVERSITY, NEW HAVEN, CONNECTICUT

OREIGN DISTRIBUTOR: LLOYD-LUKE (MEDICAL BOOKS) LTD., 49 NEWMAN STREET, LONDON W. 1

JOURNAL OF THE HISTORY OF MEDICINE
AND ALLIED SCIENCES

BOARD OF EDITORS

JOHN F. FULTON, *Editor*
MADELINE E. STANTON, *Assistant Editor*
ELIZABETH H. THOMSON, *Assistant Editor*

FRANKLIN L. BAUMER
MAX H. FISCH
GENEVIEVE MILLER
GEORGE ROSEN
HENRY E. SIGERIST
LLOYD G. STEVENSON

STUDENT EDITORS

JOHN C. BAILAR III
GEORGE W. BOSTWICK
MILTON CORN
LOUIS A. CORVESE
WILLIAM O. EDWARD
F. ROBERT FERETY, JR.
JACK PETER GREEN
KATHERINE B. HESS
ROBERT J. T. JOY
ROBERT A. KRAMER
HARRY C. MILLER
JOSEPH S. PAGANO
JACQUES M. QUEN

CONSULTING EDITORS

HOWARD ADELMANN, *Ithaca*
WYNDHAM B. BLANTON, *Richmond*
GEORGE W. CORNER, *Baltimore*
T. G. H. DRAKE, *Toronto*
WILLIAM W. FRANCIS, *Montreal*
CLAUDE E. HEATON, *New York*
EDWARD H. HUME, *New York*
OLOF LARSELL, *Minneapolis*
CHAUNCEY D. LEAKE, *Galveston*
W. B. MCDANIEL, 2d, *Philadelphia*
RALPH H. MAJOR, *Kansas City*
MARY LOUISE MARSHALL, *New Orleans*
J. M. D. OLMSTED, *Berkeley*
CURT PROSKAUER, *New York*
J. B. DEC. M. SAUNDERS, *San Francisco*
RICHARD H. SHRYOCK, *Baltimore*
GEORGE URDANG, *Madison*
HENRY R. VIETS, *Boston*
GREGORY ZILBOORG, *New York*
J. JOHNSON ABRAHAM, *England*
JUAN RAMON BELTRÁN, *Argentina*
F. J. COLE, *England*
A. CORSINI, *Italy*
O. COSTA MANDRY, *Puerto Rico*
SANTOS A. DOMINICI, *Venezuela*
PEDRO LAIN ENTRALGO, *Spain*
FLAMINIO FÁVERO, *Brazil*
H. FISCHER, *Switzerland*
EDV. GOTFREDSEN, *Denmark*
JENS L. HANSEN, *Denmark*
J. JOAQUIN IZQUIERDO, *Mexico*
STEN LINDROTH, *Sweden*
JOSÉ LÓPEZ SÁNCHEZ, *Cuba*
CARLOS MARTINEZ DURÁN, *Guatemala*
RAYMOND NEVEU, *France*
VIRGILIO PAREDES BORJA, *Ecuador*
CARLOS ENRIQUE PAZ SOLDAN, *Peru*
D. V. SUBBA REDDY, *India*
RAYMOND DE SAUSSURE, *Switzerland*
RAFAEL SCHIAFFINO, *Uruguay*
AUGUSTO DA SILVA CARVALHO, *Portugal*
CHARLES SINGER, *England*
I. D. STRASCHUN, *USSR*
A. SUHEYL UNVER, *Turkey*

Subscriptions. The Journal is published quarterly in January, April, July, and October from the Department of the History of Medicine, Yale University. Publication Office is at New Haven, Conn. Subscriptions should be sent to the Department of the History of Medicine, 333 Cedar Street, New Haven 11, Conn., or to Lloyd-Luke (Medical Books) Ltd., 49 Newman Street, London W. 1, England, at the following rates: $7.50 a year; single copies $2.50 postpaid.

Entered as second class matter at the Post Office at New Haven, Conn., 14 February 1952 under the Act of March 3, 1879.

JOURNAL OF THE HISTORY OF MEDICINE
AND ALLIED SCIENCES

Volume IX *July 1954* *Number 3*

PIPERNO, TRILUSSA, AND DENTAL CARICATURE, *Dorothy M. Schullian* 273

A REAPPRAISAL OF RESEARCHES LEADING TO THE DISCOVERY OF INSULIN, *Joseph H. Pratt* 281

SOME VARIANT THEORIES IN OPPOSITION TO THE GERM THEORY OF DISEASE, *Phyllis Allen Richmond* 290

THE CURIOUS OBSCURITY OF DR. JAMES LIND, *A. P. Meiklejohn* 304

JACOB HELM'S OBSERVATIONS AND EXPERIMENTS ON HUMAN DIGESTION. A One Hundred and Fiftieth Anniversary, *Bruno Kisch* 311

THE CONTRIBUTION OF NEUROLOGY TO THE SCEPTICISM OF ALFRED DE VIGNY, *Irving Massey* 329

AMERICAN ASSOCIATION OF THE HISTORY OF MEDICINE. Abstracts of Papers, New Haven Meeting 349

NOTES AND QUERIES 360

Denis I. Duveen and Herbert S. Klickstein: John Dalton's Autopsy; *E. Dvoichenko-Markov:* American Doctors in the Crimean War; Smallpox at Cornwall, Connecticut, in May 1801; Indian Association of the History of Medicine; *J. Menzies Campbell:* Sir Frank Colyer, F.D.S., F.R.C.S., LL.D., An Appreciation; International Scholars Forum; Chicago Society of Medical History; Galen's "De usu partium"; Bibliography of the History of Science; Professor Dr. Luis de Pina; The Reform Act of 1832 and After; Zahalon and Lemon Juice for Scurvy; Riunioni Medico-Chirurgiche Internazionali, Torino; *Chauncey Leake:* The Gest Oriental Library at Princeton University

BOOK REVIEWS 374

Erwin H. Ackerknecht. *Rudolf Virchow. Doctor. Statesman. Anthropologist.* Reviewed by Averill A. Liebow 374

Roland H. Bainton. *Hunted Heretic. The Life and Death of Michael Servetus 1511-1553.* Reviewed by C. D. O'Malley . . . 375

Michael Servetus. *A Translation of his Geographical, Medical and Astrological Writings with Introductions and Notes* by *Charles D. O'Malley*. Reviewed by Roland H. Bainton 378

S. van der Woude. *Verguisd Geloof*. Reviewed by John F. Fulton 379

A. C. Crombie. *Augustine to Galileo: The History of Science A.D. 400-1650*. Reviewed by Dorothy Stimson 379

Augusto d'Esaguy. *Jacob de Castro Sarmento. Notas relativas à sua vida e à sua obra*. Reviewed by Nilson Rezende 381

U.S. Army. North African-Mediterranean Theater of Operations. *The Physiologic Effects of Wounds*. Reviewed by Frank B. Berry 383

Bernhard Milt. *Franz Anton Mesmer und seine Beziehungen zur Schweiz. Magie und Heilkunde zu Lavaters Zeit*. Reviewed by George Rosen 384

Hector J. Rossello. *Cátedra de Cultura Médica*. Reviewed by J. Pi-Sunyer 385

Mirko Drazen Grmek. *Santorio Santorio. Istarski Lijecnik*. Reviewed by John F. Fulton 386

Mary T. Martin Sloop, with Legette Blythe. *Miracle in the Hills*. Reviewed by Robert J. T. Joy 387

Wolfram Kock. *Kung. Serafimerlasarettet 1752-1952. En studie i svensk sjukvårdshistoria*. Reviewed by Adolph B. Benson . . . 387

Sir Gordon Holmes. *The National Hospital, Queen Square, 1860-1948*. Reviewed by John F. Fulton 389

NOTES ON CONTRIBUTORS 390

Printed in the United States of America
by the Van Dyck Printing Company
New Haven, Connecticut

Piperno, Trilussa, and Dental Caricature

DOROTHY M. SCHULLIAN

FUTURE historians of dentistry will find much to note in the eminent career of Dr. Arrigo Piperno of Rome, who died on 2 April 1947, at the age of sixty-eight.[1] Native of the hill town of Spoleto in Franciscan Umbria and holder of the licentiate of medicine in Italy, he turned to a newer country for training in dentistry and in 1908 received the degree of Doctor of Dental Surgery from the Chicago College of Dental Surgery. That institution had cause in the years that followed to claim him with increasing pride as an alumnus. His publications are many in the fields of both practical dentistry and the history of dentistry; a partial list is given in an appendix. During World War I he served as medical captain of the Italian Red Cross in charge of the odonto-stomatological section of War Hospital No. 4. The assignment included a mission to Paris and Lyons in 1915 to study odonto-stomatological methods in use in hospitals in those cities. For many years he was supervising dentist for the municipal schools of Rome and initiated in that capacity an effective program of dental prophylaxis for school children. Until the year of his death he taught dentistry at the University of Rome. His services to the Federazione Stomatologica Italiana were many and constant. In Italian and international congresses of dentistry he was a familiar and active figure, and as one of the editors of *La Stomatologia* he fought unceasingly and successfully against the lowering of standards in dental education. It is no exaggeration to say that in large part the advances made in Italy in the science of stomatology during World War I and in the period between the wars may be credited to him.

Dr. Piperno returned to the United States in 1913 to attend the celebration in honor of his teacher, Dr. Truman W. Brophy. He was in Chicago again in 1933 to present a paper before the Chicago Centennial Dental Congress. But even during the years in Italy his close relations with American dentistry were lovingly maintained through his honorary membership in the American Stomatological Association and his collaboration on *The Review of Clini-*

[1] On the facts of his life see e.g. *Chi è?* (Roma, 1936, p. 733); the obituary in *L'Osservatore Romano*, 9 April 1947, p. 2; and the tribute by Prof. B. De Vecchis in *Clinica Odontoiatrica* (1947, 2, 195-196). The account as given in this paper was assembled with the gracious assistance of his widow, Signora Erminia Piperno Lalli, who died on 6 October 1953, and of her nephew and his successor in private practice, Dr. Pio Lalli.

Copyright 1954 by JOURNAL OF THE HISTORY OF MEDICINE AND ALLIED SCIENCES, Inc.

cal Stomatology, official organ of that association, and on *The Bur*, published by The Alumni Association of the Chicago College of Dental Surgery. It is scarcely necessary to state that he handled the English language skilfully and effortlessly. His letters to the author of this paper,[2] whether in English or Italian, are models of the epistolary art.

The fact that Dr. Piperno in the midst of his public duties and his extensive private practice found time to work also on the history of dentistry is proof of a breadth and humanity of interests which this journal would fain discover more often in men of science.[3] In his opinion the contributions to dentistry of figures like Hippocrates, Celsus, Soranus, Avicenna, Albucasis, Ruggiero da Parma, Guglielmo da Saliceto, Bartolomeo Eustachio, and Ambroise Paré were worthy of careful attention. Jewish by birth, he related to his fellow dentists in Italy the moving legend of St. Apollonia. His interests extended beyond dentistry. He was passionately devoted to the violin and performed creditably upon it. In his hermitage at Monteluco above Spoleto, in an old monastery of the order of Hermits, he assembled an outstanding library of precious volumes and a splendid collection of objets d'art. But it is his relations with a Roman poet which we shall examine in particular here.

Dr. Arrigo Piperno was dentist to many eminent Italians.[4] Among them was Pope Pius XII, who gave him refuge with the Vatican during the difficult period of the German occupation in Rome. Among them was also Carlo Alberto Salustri, who, writing in the romanesco dialect under the pseudonym Trilussa and following in the tradition of Belli and Pascarella, brought continued delight through long years to so many citizens of Rome and of Italy. His verses are in fact world-wide in their appeal for the reason that they caricature all humanity. Regional at first, satirizing everyday events in the middle-class society of Rome the capital, the sonnets progressed later to a development of the classical fable in which, in the disguise of the animal, the weaknesses and passions, treacheries and self-deceptions of all classes in Rome and therefore of all mankind are ridiculed with smiling malice and good-natured

[2] The writer is grateful to Colonel Marc J. Grossman of Cleveland, who, serving in the Army of the United States in Rome during World War II, was able soon after to put her in touch with Dr. Piperno.

[3] His motto, taken from Luigi Cornaro's *Discorsi della vita sobria*, reveals his philosophy: "La vita che io vivo è viva."

[4] He manufactured two proprietary products, a dentifrice named Monteluco which was adopted by Queen-Mother Margherita and Queen Elena, and a concentrated solution for the gums called Gengiviticon.

moralizing. The definitive edition in Italian, by Mondadori of Milan, had run in 1946 to fourteen volumes.[5] Because of their universality the poems have undergone translation into many languages, including English.[6] On 1 December 1950, Trilussa, who at the age of fourteen had sent his first verses to a Roman newspaper, received the honored title of Senator of the Republic of Italy. Twenty days later he died, poor in worldly goods but well beloved of his Rome.

It was not only into verses that Trilussa injected his pungent satire. Gifted also with rare talent for drawing, he produced throughout his career hundreds of striking caricatures. Some illustrate his poems in the printed editions, others are independent of the verses. Any medium sufficed him—pencil, water colors, a bit of cardboard, a scrap of wrapping paper. Any subject which pointed the way to gentle ridicule was fair game, and dentistry offered a choice and wide field.[7] Because his dentist was also his friend we are the richer for a series of nineteen dental caricatures which he presented to Dr. Piperno.[8] They were done in the years 1921 to 1936 and are now in the possession of this writer. The black-and-white reproductions furnished here lack the vividness of the original water colors,[9] but the satire is unchanged, and the pictures take deservedly a prominent place in the history of dental caricature and of dentistry itself.

They may be roughly grouped into five subjects which were clearly favorites with the artist. The first is pain, the one element which can drive a patient perforce and against his will to the dentist's office. Little red devils personify it admirably and classically as they stab with their cruel spears at eye and cheek and mouth until the victim screws up his face in agony (I). The same effect is produced by a crablike creature, black of body and with malevolent red eyes, which from atop the victim's head sends down along the right side of his face three long, curving tentacles in an embrace like that of an octopus (II). The victim, for whom all this

[5] In November, 1951, the same publisher issued a single volume containing the entire corpus.

[6] *Trilussa, Roman satirical poems and their translation,* by Grant Showerman. Edited by Dorothy M. Schullian (New York, 1946).

[7] In 1927 Trilussa and Guglielmo Guasta, Director of *Travaso,* performed with puppets Trilussa's "Dal Dentista." See *Trilussa Travasissimo, Rivista Mensile del Travaso,* N. 41 bis, January 1951, p. 15.

[8] They are signed sometimes "Trilussa" and sometimes "Tri," the name used by his special friends.

[9] Many of the caricatures were reproduced in color in series carrying the legends "Omaggio al Dentifricio MONTELUCO" and "Omaggio del Direttore de 'La Stomatologia'." A black-and-white reproduction of III appears in *Pantheon,* 1951, 5, p. 229.

is reality and not a fantasm of the imagination, finally bandages his aching jaw and in desperation nerves himself to push the doorbell of his dentist (III). He may be wearing a debonair brown derby and carrying a sporty cane; the pain remains, however, and it is not lessened as fellow-sufferers join him or as the merely curious flock around like the knitting women at the guillotine. Once inside, he sits patiently on a stool awaiting the pleasure of the dentist (IV); he is the picture of abysmal dejection, and at this crisis in his life the one earthly comfort which remains to him is the comrade who is always man's best friend, his dog.

By some strange mutation the sex of the victim has changed for the process which normally comes next in chronological order, the examination of the patient's mouth (V, VI, VII, VIII). But one need not look long for the reason. A woman's figure, and, especially in the period during which these pictures were done, her costume offer far richer material to the caricaturist. She may be very tall, and the poor dentist, whose long white laboratory coat adds not a centimeter to his actual stature, must stand on tiptoe in order to peer through his glasses into the gaping cavity of her mouth. He may grasp her by both arms to retain his balance, while the red ornament on her turban bobs above him in distracting fashion. If she wears a hat, he may clutch its feathers to push her head back and improve his view of her teeth; the result of course is that the fragile feathers, wrenched from their moorings, flutter down one by one behind her. Her shoes are invariably high and pointed, with the typical Italian heel of that era. Her skirt may be blue, her blouse a rose-and-blue print; she may favor browns and blacks, or purples, and the feathers may on occasion be ostrich plumes looking a little bedraggled, but duly accompanied by earrings. She betrays more than once her over-indulgence, for a period of many years, in delicious Italian pasta, and the dentist is compelled to flatten his own abdomen if he would get near enough to see into her mouth. Sometimes he misjudges the distance and his nose invades her mouth while she grabs at his coat. In the background there is often a table holding instruments in a jar of antiseptic, or on the wall a stark picture of teeth.

For actual work the patient is again a man. He sits in one caricature (IX) on a short-legged stool, his feet and legs bent beneath it, his right hand pulling nervously at his left while the bearded dentist pushes his head back and toils over his mouth with an instrument. Beneath the table sits a huge cat, and on the wall hangs

I II

DENTISTA
Un brutto Tasto...

V

IV

VI

VII

VIII

IX

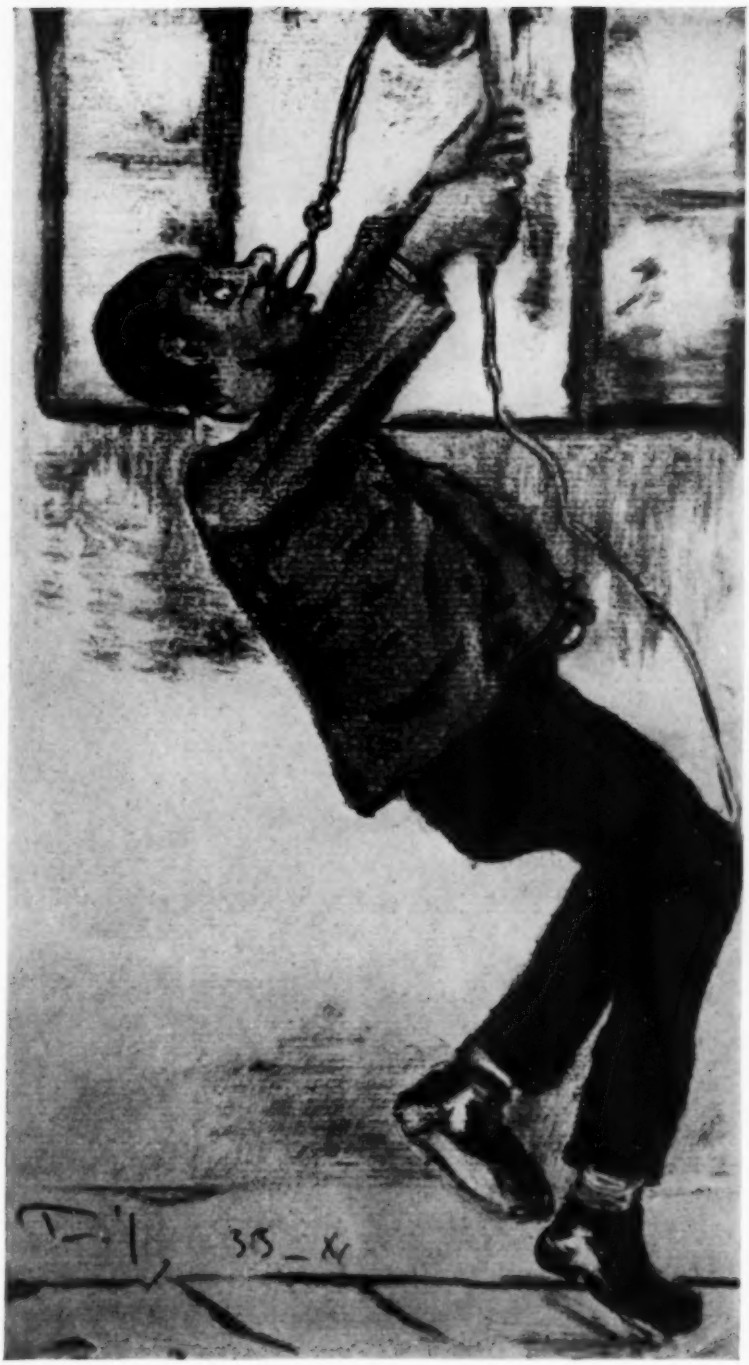
X

XI

XII

XIII

XIV

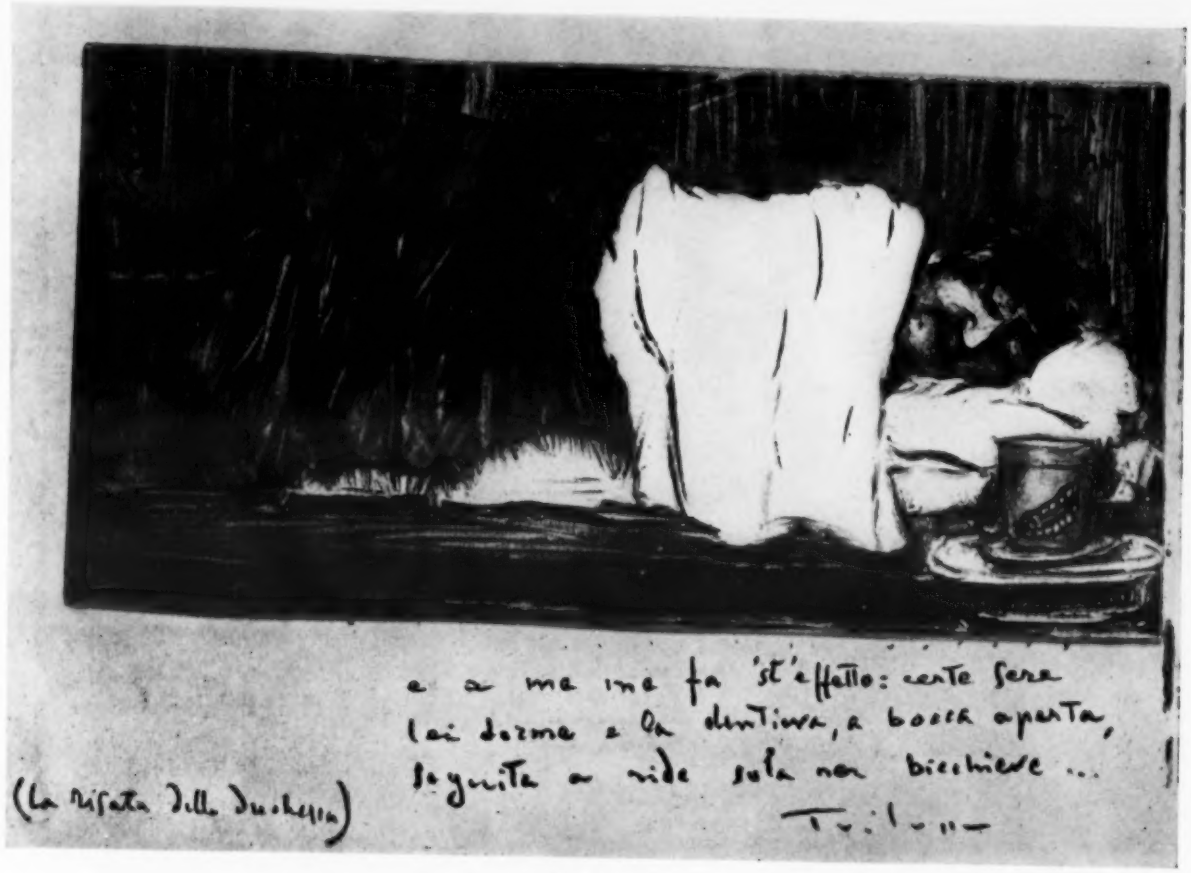


XV

XVI

XVII

XVIII


a a me me fa 'st'effetto: certe sere
lei dorme a la dentiera, a bocca aperta,
la gente a ride sola nea bicchiere ...
(La risata della Duchessa)

a cabinet whose shelves are filled with jars of colored medicines. But it is when the patient is established in the typical dentist's chair that the satire of the caricaturist is at its best (X). For here the patient, tipped far back in the chair and with his feet off the support and pointed straight toward the ceiling, suddenly retaliates by catching his tormentor's left forefinger between his teeth and biting hard. It is a strong and formidable set of teeth, the whiteness of which is accentuated by the whiteness of the dentist's startled eyes and by his laboratory coat. This whiteness is itself striking in contrast with the black of the patient's suit and of his shaggy hair, the red of his necktie, and the blue of the chair. A large pail stands on the floor nearby. Through a window there is a view of a more normal world outside.

It is, however, the specific work of extraction which is particularly vulnerable to ridicule. Trilussa has made it a physical feat for the dentist, a test of strength in which he ultimately subdues the patient only because he is equipped with a pair of pliers of a size to serve as fireplace tongs. The patient looks grim and unhappy even before the work begins (XI). At the first tug he doubles his knees upon his chest and braces his feet against the dentist's chest (XII); the dentist meanwhile seeks support for one leg beneath the seat of the chair, and the chair, not anchored sufficiently, totters wildly upon its standard. Or the patient may clutch the skirt of his wife as she stands beside the chair (XIII) in a costume of purple and green and red which is scarcely calculated to have a soothing effect on his nerves. Their small son meanwhile, left to his own devices in the background, finds the moment propitious to aim a sling-shot at the dentist. The dentist's forbear on the wall, medals strung across his chest in imposing array, can almost be heard to assert that in his day such happenings did not occur.

The aftermath of every extraction in a dentist's office is an extraction of a different sort, that of money. The smile of the dentist as he presents his oversized bill cannot reduce the shock to the startled patient (XIV); even as he feebly tries to extract some currency from his left inside pocket his eyes, fixed upon the figures which seem to him quite astronomical, are wide with incredulity. Perhaps he wishes that he had pulled his own tooth in some homemade arrangement like the pulley-and-rope device, where the sufferer attaches a pair of pincers to one end of the rope, applies the pincers to the ailing tooth, and then with both hands tugs hopefully on the other end of the rope (XV). But there are always two

extractions which, for any one individual, are of unusual significance, his first and his last. Trilussa has portrayed them well in two caricatures duly labeled, with a play also on the lottery in Italy, "Primo estratto" (XVI) and "Ultimo estratto" (XVII). It is the old peasant grandmother, seated on a square stool, worn brown mules on her feet and a pink kerchief around her head, who with her right index finger prepares to pull the first tooth for the little boy nestled in the folds of her skirt. Her left hand pushes back his head, his left arm clutches at her knee. Later he will proudly display the tooth to his schoolmates, just as, in "Ultimo estratto," the man of consequence, in brown suit, white vest, black derby, mustache, and bandaged jaw, holds up for admiration between thumb and index finger his huge and last tooth. The audience here is a woman in brown skirt, purple jacket, black hat, and white gloves, who inspects the treasured object through her lorgnette and duly pronounces, we hope, the proper words of approval and praise.

Extractions lead to dentures, to the final services of a dentist to his client, and to the fifth and last in our group of caricatures. It consists of only two pictures. In one (XVIII) a dentist examines a denture while a woman waits nearby. She is dressed in blue suit and high black shoes; the striking feature however is her broad grin, by which she displays the few teeth which still remain to her. In the other (XIX) we meet the duchess of Trilussa's sonnet "La Risata de la Duchessa."[10] By day she laughs to show her fine white teeth and deceive her friends. Each night, however, the teeth are carefully immersed in a glass of water on a table beside her bed, and as she slumbers there, a huge mass beneath a blanket of red wool, they seem to laugh again in a nocturnal merriment all their own. Trilussa has written below the last three lines of his sonnet. His satire is clearly identical whether it flows from pen or from brush, and dental history has cause to be grateful that he and Dr. Piperno were friends.

BIBLIOGRAPHY OF ARRIGO PIPERNO

1904

Contributo allo studio della resistenza dei globuli rossi del sangue alle soluzioni cloruro-sodiche ipoisotoniche. *Policlinico, Sez. med.,* 1904, *11,* 318-334, 375-388.

1907

Salute; libro di letture d'igiene popolare ad uso delle scuole medie, con prefazione dell' On. Prof. Angelo Celli. Roma-Milano, Società Editrice Dante Alighieri di Albrighi, Segati & C., 1907.

[10] Mondadori edition, 1951, p. 310.

1908

Profilassi orale. *Stomatologia (Roma)*, 1908, *7*, 137-149.

1909

La profilassi orale nelle scuole. *Vita sanitaria*, 5-6 May 1909.

1910

Un manuale per l'infermiere del sec. XVII. *Riv. Storia Sci. med. nat.*, 1910, *1*, 79-80.

Un po' di stomatologia del passato (1500-1800). *Stomatologia (Roma)*, 1910, *8*, 113-120, 169-176, 241-255.

La tolleranza filosofica delle malattie ed il Pitagorismo del celebre medico Antonio Cocchi. *Riv. Storia Sci. med. nat.*, 1910, *1*, 66-71.

1911

I recenti progressi della stomatoiatria sociale in America. *Stomatologia (Roma)*, 1911, *9*, 246-251.

Stomatite e gastrite acuta d'origine tossica in seguito a cure dentarie (avvelenamento da arsenico). Comunicazione letta all' VIII. Congresso Italiano di Stomatologia, Napoli, 20-23 aprile 1911. *Stomatologia (Roma)*, 1911, *9*, 540-545.

1912

Abrasions dentaires et hygiène buccale. Comptes rendus du Deuxième Congrès Français de Stomatologie, Paris, 1911. *Revue Stomatol. (Paris)*, 1912,

Descrizione storica del trattamento delle fratture delle ossa mascellari. *Riv. Storia Sci. med. nat.*, 1912, *3*, 93-98.

1913

Bartolomeo Eustachio e il libello "De Dentibus." *Stomatologia (Roma)*, 1913, *12*, 10-19.

Descrizione storica del trattamento delle fratture delle ossa mascellari. *Stomatologia (Roma)*, 1913, *11*, 229-234.

Fratture delle ossa mascellari e loro cura. Con 118 figure su XXVIII tavole. Torino, Unione Tipografico Editrice Torinese, 1913. 188 pp.

Historical description of the treatment of maxillary fractures. *Bur*, 1913, *18*, 53-60.

La profilassi orale e le tendenze sociali della moderna odontoiatria. Prolusione al Corso Universitario tenuta nel R. Istituto d'Igiene Sperimentale in Roma il 19 dicembre 1913. Milano, Casa Editrice L. F. Cogliati, 1913. 15 pp.

Lo stato presente della stomatoiatria sociale in Italia. *Stomatologia (Roma)*, 1913, *11*.

Treatment of mandibular fractures. Fourteenth Annual Meeting of the American Dental Society of Europe. March, 1913. *Dent. Rev. (Chicago)*, 1913.

1915

Metodi odierni di cura delle fratture mandibolari. *Stomatologia (Roma)*, 1915, *13*, 413-432.

1916

Contributo alla storia dell' invenzione dei denti di porcellana. *Stomatologia (Roma)*, 1916, *14*, 272-278.

Legature dentaria metallica intermascellare d'urgenza in alcune fratture della mandibola. *Stomatologia (Roma)*, 1916, *14*, 265-268.

Malattie dentarie e profilassi orale nei militari. *Stomatologia (Roma)*, 1916, *14*, 316-321.
Modern methods of treating jaw injuries. *Brit. dent. J.*, 1916, *37*, 23-36.
Le mutilazioni facciali e mascellari di guerra. *Nuova Antol.*, 1 June 1916, *183* (ser. 6), 307-318.
Sopra la facoltà anti-odontalgica d'alcuni coleotteri. *Stomatologia (Roma)*, 1916, *14*, 293-299.

1917

Le cure dentarie ai militari in zona di guerra. *Policlinico, Sez. prat.*, 1917, *24*, 1187-1189.
A dentist's help at the Italian Front. *Dent. Rev. (Chicago)*, 1917, *31*, 31-35.
Malattie dentarie e profilassi orale nei militari. *Policlinico, Sez. prat.*, 1917, *24*, 183.

1921

Servizio odontoiatrico nelle scuole. Relazione al X. Congresso Stomatologico Italiano, Trieste, ottobre 1921. *Stomatologia (Roma)*, 1921. 11 pp.

1924

La leggenda di Sant' Apollonia. *Stomatologia (Roma)*, 1924, *22*, 670-675.
I Papi contro gli abusivi della piccola chirurgia. *Stomatologia (Roma)*, 1924, *22*, 19-24.

1927

School mouth hygiene and stomatology. *Med. J. Rec.*, 1927, *125*, 45-46.
Su la terza dentizione. *Stomatologia (Roma)*, 1927, *25*, 27-32.

1928

Artrite della spalla e del ginocchio da focolaio settico peridentale. *Boll. Accad. lancis. Roma*, 1928, *1*, 212-216.

1933

Un caso di anisocoria da causa dentaria. Comunicazione presentata al Chicago Centennial Dental Congress, Chicago, 7-12 agosto 1933. *Riv. ital. Stomatol.*, 1933, *2*, 768-770.

1934

Anisocoria of dental origin. *J. Amer. dent. Ass.*, 1934, *21*, 1459-1461.

1935

La stomatologia italiana nel servizio scolastico. *Acta med. ital.*, 1935, fasc. VI, 7 pp.

1946

Lezioni di odontoiatria conservativa presso l'Università di Roma.

A Reappraisal of Researches Leading to the Discovery of Insulin*

JOSEPH H. PRATT**

FREDERICK G. Banting, a young surgeon, and Charles H. Best, a junior medical student, worked day and night from May 1921, for many months in the physiological laboratory of Professor J. J. R. Macleod at the University of Toronto with the object of extracting the internal secretion of the pancreas for its use in the treatment of diabetes mellitus. They labored under the false idea, which Macleod shared with them, that extracts of the pancreas "must usually contain powerful proteolytic enzymes which could digest or destroy any internal secretion also present."[1] They did not know that Heidenhain as early as 1875 had shown that extracts of the fresh pancreas have no proteolytic activity. "The cells of the living pancreas," wrote Heidenhain,[2] "contain no free proteolytic ferment, but a zymogen which under certain conditions forms an active ferment." He took one-half of a pancreas immediately after killing the animal and made a glycerin extract of the pulverized tissue. The other half was allowed to remain at room temperature for twenty-four hours before the glycerin extract was prepared. The first in a solution of 1.2 per cent sodium bicarbonate was *"absolut unwirksam,"* the second strongly active. Bayliss and Starling[3] state that Heidenhain's work was confirmed by Langley who "showed that the proteolytic ferment was in the fresh gland present, not preformed but in the form of a precursor trypsinogen." These authors also pointed out that Délézenne and Frouin,[4] working in the Pasteur Institute, found that the pancreatic juice if drawn from a cannula in the duct so as to avoid any contact with the little patch of mucous membrane forming the floor of the fistula, is perfectly free from trypsin, and that this body is formed from trypsinogen in Pavlov's experiment as the juice trickles from the mouth of the duct over the mucous membrane. Trypsinogen in the pancreas is slowly converted into trypsin, according to Northrop,[5] by traces of trypsin present in the gland. This explains the

* The German text of this paper appeared in *Sudhoff's Archiv für Geschicte der Medizin und der Naturwissenschaften*, 1954, *38*, Heft 1.

** Boston, Massachusetts.

positive result obtained by Heidenhain when the pancreas was allowed to remain at room temperature for twenty-four hours.

On the wall of the laboratory in which Banting and Best conducted their experiments is a plaque which reads "On the 30th of October, 1920, Frederick Grant Banting originated the hypothesis that the failure theretofore to isolate the internal secretion of the pancreas had been due to the destruction by the ferments liberated during the process of extraction. He devised an experimental method by which this destruction could be avoided and the internal secretion (now known as insulin) obtained. In May 1921 Banting and Charles Herbert Best, both graduates of the University of Toronto, conducted in this room the experiments which culminated in the isolation of insulin."

The experimental method referred to on the plaque consisted of making an aqueous extract of the pancreas of a dog after it was thought degeneration had occurred as a result of tying the pancreatic duct. A paper by Barron[6] that Banting chanced to read led him to believe that the procedure of tying the ducts would result in destruction of the acini but leave the islets intact. This inscription was reprinted without comment in the pamphlet issued by Eli Lilly and Company, makers of insulin, in 1947 to commemorate the 25th anniversary of its discovery. It also appears in Dr. Lloyd Stevenson's authoritative biography, *Sir Frederick Banting*, published in 1946. Notwithstanding his admiration for Banting, Stevenson's knowledge of the facts and his regard for the truth impels him to print in his book below the copy of the inscription the following sentence: "The hypothesis mentioned has not been confirmed on closer examination." Stevenson then refers to a footnote he made on another page which reads: "The digestive ferments of the pancreas must be activated in the bowel before they attain their destructive powers." In still another footnote he states: "It has since been shown that the islets share to a minor degree the degeneration which takes place in the rest of the gland, and that a duct-tied gland actually contains less insulin than a normal gland."

Textbooks of physiology, pathology, and medicine still teach the view held by Banting that obstruction of the pancreatic ducts leads to destruction of the acini but leaves the islands intact. For example, in the eighth edition of a leading American textbook of medicine published in 1951 the statement is made that "Banting and Best prepared an extract of the islet tissue of the pancreas when the tryptic portion had degenerated after ligation of the pancreatic

ducts. This extract corrected all the obvious disturbances of carbohydrate metabolism both in pancreatectomized dogs and in human beings with diabetes mellitus."[8] In the new edition of a standard work on pathology that appeared as late as 1953, the author states that "it was by producing experimental obstruction of the pancreatic duct by means of ligation that Banting and Best first succeeded in freeing the islet tissue from the trypsinogen-producing acini and were thus enabled to extract insulin."[9] It would appear that the brilliance of the discovery made in Toronto so blinded the critical faculties of contemporary scientists that they accepted Banting's statements without question. If they had examined them, they would have found that the two most thorough studies of the atrophy of the pancreas produced by occluding the pancreatic ducts, namely those of Milne and Peters[10] and those of F. M. Allen,[11] had presented conclusive evidence that there was greater or less destruction of the islands and some preservation of the acini. In an earlier study the writer[12] reported that in four dogs no islands were found in the atrophic pancreas but acini were easily demonstrated. These findings were confirmed by Dr. Frank B. Mallory, an authority in pathological histology, who examined the microscopic specimens. Even Macleod in his last article on insulin, published in 1929, still referred to "the powerful ferment of the intact pancreas."[13]

The only other writer besides Stevenson who has stated in print that Banting's hypothesis was not confirmed is his collaborator, Charles H. Best. In his Beaumont Lecture published in 1948, Best stated that as "active trypsin is not present in simple extracts of pancreas by the procedures we initially used, success would have been secured with the chemical and physiological procedures which we were using at that time. That this is true can, in fact, be readily demonstrated."[14] Apparently Banting died without ever having learned that in his experiments he had attempted to destroy something that did not exist, namely, an active proteolytic ferment in the fresh pancreas.

There is another error in the inscription. Banting was not the first to originate the hypothesis that the internal secretion of the pancreas might be obtained by tying the duct and thereby causing the acini to degenerate and thus enable the chemical products of the islands to be obtained unmixed with digestive ferments. Ssobolew as early as 1902 wrote: "By tying the pancreatic duct we have now a means of isolating the islands anatomically and of studying

their chemical properties freed from the digestive ferments. This anatomical isolation of the islands will permit the testing in a rational way of an organic therapy of diabetes."[15]

Lydia M. DeWitt of Ann Arbor in 1906 accepted the hypothesis of Ssobolew which was the same that Banting put forward fifteen years later. She stated that: "Since the experiments of Schulze and Ssobolew and others showed that by ligation of the duct and interference with the outflow of the pancreatic secretion, a complete atrophy of the glandular acini of the pancreas was caused while the areas of Langerhans might be isolated in considerable portions of the pancreas and the physiological action of their extract determined, it was with this purpose that the experiments were undertaken."[16]

E. L. Scott in 1912 held a similar view when he started a series of experiments in Carlson's laboratory in Chicago. He hoped, he wrote, "that the presence of the digestive enzymes could be eliminated by the atrophy of the gland which follows complete ligation of the ducts but after several attempts in the dog which proved futile as far as complete atrophy was concerned this method was abandoned as impractical."[17] The Toronto investigators knew of Scott's work. They thought the fact that he extracted the pancreas with alcohol highly important as the alcohol had, according to their view, destroyed the activity of the proteolytic enzymes.

In fairness to Professor Macleod it should be stated that other eminent American physiologists held the same mistaken belief that active proteolytic ferments are present in the normal fresh pancreas. Scott and doubtless his chief, Professor A. J. Carlson, held it. Scott states that "these enzymes were rendered inactive at once by a high percentage of alcohol." Professor John R. Murlin of the University of Rochester also believed that the action of the enzymes must be eliminated. He and his associates extracted the pancreas with strong HCl "with the idea of destroying trypsin."[18]

A number of investigators showed that simply tying the pancreatic duct did not lead to permanent digestive disturbances or to atrophy of the gland. Pratt, Lamson, and Marks[19] demonstrated that the negative results were due to activation of the pancreatic juice by the necrotic tissue about the ligatures leading to the formation of sinuses by digestion which permitted the pancreatic juice to re-enter the intestine. When they prevented this re-entry by imposing living tissue in the form of the omentum between the pancreas and duodenum, there was great loss of weight and bulky

stools due to poor absorption of fat and protein. In a dog killed two months after excluding the pancreatic juice from the intestine, the pancreas was converted into a "small, shriveled, very firm, nodular to coarsely granular mass." The processus lienalis was 2.5 cm. long, 0.5 to 1 cm. wide, and 0.3 cm. thick. The corpus pancreatis and the processus uncinatus were represented by a firm mass of tissue 3 by 2 by 1.5 cm. embedded in adhesions about the duodenum. Certainly an atrophic pancreas such as this would yield very little tissue juice, not over 1 or 2 cm. at the most. When Banting and Best[20] state that they obtained 125 cc. of tissue extract from the pancreas of a dog "whose pancreatic ducts had been ligated for ten weeks," they are furnishing convincing evidence that they are not dealing with an atrophic gland. If, as is here claimed, Banting and Best were really working with essentially normal tissue, then an extract of fresh normal pancreas should be expected to yield an equal drop in blood sugar. That it did so was shown by figures published by Banting and Best. From their chart the following table has been prepared:

DEPANCREATIZED DOG

	Blood Sugar Mg.%	*Fall in Blood Sugar Mg.%*	*Intravenous Injection*
August 15			
Noon	300	70	10 cc. extract "degenerated"
1 p.m.	230		pancreas.
August 16			
10 a.m.	300		10 cc. "degenerated" pan-
11 a.m.	180	120	creas extract + 0.1% HCl.
August 17			
6 p.m.	300		10 cc. normal gland extract.
7 p.m.	170	130	
August 18			
Midnight	220		10 cc. normal gland extract
4 a.m.	150	70	+ 0.1 HCl.

It is perfectly obvious from these figures that the extract of the normal gland was as active in reducing blood sugar as that of the so-called "degenerated" gland. How Banting[20] could look at his own figures and then conclude that "it is obvious from the chart that the whole gland extract is much weaker than from the degenerated gland" is certainly puzzling. As early as December 1922 Roberts of the Department of Physiology of Cambridge University

in a letter to the editor of the *British Medical Journal* stated that "a glance at the chart is sufficient to convince anyone that the only reasonable conclusions that can be made are (1) that the whole gland is more effective than the degenerated; (2) that the extract from the whole gland causes a more lasting effect than does that from the degenerated gland."

The Toronto investigators thought that Scott was the first to extract the intact pancreas with alcohol. They had not learned of the earlier work of Zuelzer[22,23,24] who extracted the anti-diabetic substance from the pancreas with alcohol. In two experiments on depancreatized dogs and in eight cases of human diabetes Zuelzer demonstrated that his preparation diminished the glycosuria and the acidosis. It, however, had toxic effects which he described in detail. When his first paper appeared in 1907, the editor stated in a footnote that he had withheld the paper from publication for three years at the request of the author. Evidently, Zuelzer asked this delay in the hope he would be able to state in his paper that he had produced a non-toxic preparation for the treatment of diabetes. He was indeed on the right track, but even with the able assistance of the staff of the Physiological Institute of the University of Berlin as well as that of the trained chemists of the Schering Company over a period of four years he was unable to lessen its toxicity sufficiently to have it employed clinically. In 1909 Forschbach[25] of Minkowski's clinic in Breslau demonstrated its striking anti-diabetic action on a depancreatized dog. In the twelve-hour period before the injection of the "hormone" the output of sugar was 16.4 grams and the D/N ratio 3.6. In the twelve hours following the injection the output of sugar fell to 1.3 grams and the D/N ratio to 0.31. The temperature, however, rose to 39.2° C. (102.6° F.). The preparation made by Schering was then given to two diabetic patients. No effect at all was produced in the first case by a preparation sixteen days old. In the second case the temperature rose to 104° and the patient was unable to void urine for twelve hours. After this untoward effect its use was entirely abandoned in Minkowski's clinic, and I have found no later reports from German clinics or elsewhere. Its marked toxicity can probably be attributed to the split products of protein, the peptones and albumoses produced by autolysis.

When Banting[26] presented at the New Haven meeting of the American Physiological Society in December 1921 the result of the work that had been carried on continuously by Best and himself

for the previous eight months, he was able to show that they had produced pancreatic extracts that reduced the blood sugar to normal and abolished glycosuria in depancreatized dogs. At that time Banting and Best had not tested their preparations on any patients. When this was done a few weeks later on a few diabetics, fever and aseptic abscesses at the site of injection resulted and their use was abandoned. They had not succeeded any more than Zuelzer had years before in producing a pancreatic extract that could be used in the treatment of diabetes. In fact Banting[27] in his Cameron Prize Lecture delivered in Edinburgh in 1929 asserted that Zuelzer's early results on diabetic patients were better than those of Best and himself. This was a generous but misleading statement as both Zuelzer's and Banting's preparations were so toxic that they could not be employed in the treatment of diabetes.

In December Professor Macleod added the biochemist, James B. Collip, to the group. In his attempt to solve the problem of extracting the internal secretion of the pancreas, unmixed with toxic substances, Collip applied known means to isolate and purify protein and protein-like substances. This approach yielded quick results, for Collip had been working only a few weeks when in January, 1922, he furnished the clinicians with the first insulin ever to be used successfully in the treatment of diabetes. It was prepared as follows:

> To a small volume of 95 per cent ethyl alcohol freshly minced pancreas was added in equal amount. The mixture was allowed to stand for a few hours with occasional shaking. It was then strained through cheese cloth and the liquid portion at once filtered. The filtrate was treated with two volumes of 95 per cent ethyl alcohol. It was found by this treatment that the major part of the protein was removed while the active principle remained in alcoholic solution. After allowing some hours for the protein precipitation to be effected, the mixture was filtered and the filtrate concentrated to small bulk by distillation in vacuo at a low temperature (18° to 30° C). The lipoid substances were then removed by twice extracting with sulphuric ether in a separating funnel and the watery solution returned to the vacuum still, where it was further concentrated till it was of a pasty consistency. Eighty per cent ethyl alcohol was then added and the mixture centrifuged. After centrifuging, four distinct layers were manifested in the tube. The uppermost was perfectly clear and consisted of alcohol holding all the active principle in solution. Below this, in order, were a flocculent layer of protein, a second clear watery layer saturated with salt and a lowermost layer consisting of crystals of salt. The alcohol layer was removed by means of a pipette and was at once delivered into several volumes of 95 per cent alcohol, or better, of absolute alcohol. It was found that this final treatment with alcohol of high grade caused the precipitation of the active principle along with adherent substances. Some hours after this final precipitation the precipitate was caught on a Buchner funnel, dissolved in

distilled water and then concentrated to the desired degree by use of the vacuum still. It was then passed through a Berkfeld filter, sterility tests made and the final product delivered to the clinic.[28]

The essential feature in rendering this preparation non-toxic was the precipitation of insulin by 95 per cent or absolute alcohol, a procedure which left the toxic products in solution.

This was the insulin that gave the Toronto investigators their deservedly great reputation. When their success was reported at the meeting of the Association of American Physicians in May 1922, Dr. Frederick M. Allen,[29] whose own laboratory studies on diabetes and its treatment were probably more extensive than those of any other scientist, said in discussing this epoch-making report, "Others have reduced glycosuria and hyperglycemia with pancreatic extracts. I have done so myself but the obvious reasons why these experiments have proved nothing is found in the great toxicity of such extracts so that the animals receiving them were injured instead of benefited and the fall of sugar could be attributed to intoxication. If, as seems to be the case, the Toronto workers have the internal secretion of the pancreas fairly free from the toxic material, they hold unquestionable priority for one of the greatest achievements of modern medicine."

What the group of chemists and physiologists in Berlin working with Zuelzer had failed to accomplish in four years, the young Canadian chemist did in a few weeks. Success came so quickly to Collip[30,31] that neither he nor his co-workers Macleod, Banting, and Best realized the great importance of his discovery that the precipitation of insulin by absolute alcohol freed it largely from contaminating products and made possible the development of a preparation that could be successfully employed in the treatment of diabetes.

Credit for the discovery of a preparation of insulin that could be used in treatment belongs to the Toronto investigators Banting, Best, Collip, and Macleod working as a team. Each of these men made an important contribution. Banting, as Stevenson has said, was "the captain of the team." It was Banting's conviction that an internal secretion could be extracted from the pancreas that enlisted Collip in the search. It should be emphasized, however, that it was Collip who was the first to prepare an extract of the pancreas that contained the internal secretion sufficiently freed from toxic products to be employed with success in the treatment of diabetes.

References

1. Banting, F. G., Best, C. H., Collip, J. B., Campbell, W. R., Fletcher, A. A., Macleod, J. J. R., and Noble, E. C. The effect produced on diabetes by extraction of pancreas. *Tr. Assoc. Amer. Phys.*, 1922, *37*, 337.
2. Heidenhain, R. Beiträge zur Kenntnis des Pankreas. *Arch. ges. Physiol.*, 1875, *10*, 557.
3. Bayliss, W. and Starling, E. H. The proteolytic activities of the pancreatic juice. *J. Physiol.* 1903-04, *30*, 61.
4. Délézenne, C. and Frouin, A. La sécrétion physiologique du pancréas ne posséde pas d'action digestive propre vis-a-vis de l'albumine. *Compt. rend. Soc. Biol.*, 1902, 691.
5. Northrop, S. H. *Crystalline enzymes; chemistry of pepsin, trypsin, bacterialphage.* New York, Columbia University, 1939, p. 80.
6. Barron, M. The relations of the islets of Langerhans to diabetes with special reference to causes of pancreatic lithiases. *Surg. Gyn. Obst.*, 1920, *31*, 437.
7. Stevenson, L. G. *Sir Frederick Banting.* Toronto, The Ryerson Press, 1940, pp. 67n, 68n, 74.
8. Loeb, R. F. Page 615 in Cecil and Loeb's *Textbook of medicine.* Eighth Ed., Philadelphia, W. B. Saunders, 1951.
9. Boyd, W. A. *Textbook of pathology.* Sixth Ed. Philadelphia, Lea & Febiger, 1953, p. 541.
10. Milne, L. S. and Peters, H. L. Atrophy of the pancreas after occlusion of the pancreatic duct. *J. med. Res.*, 1912, *26*, 405.
11. Allen, F. M. *Studies concerning glycosuria and diabetes.* Boston, Leonard, 1913.
12. Pratt, J. H. The relation of the pancreas to diabetes. *J. Amer. med. Ass.*, 1910, *55*, 2112.
13. Macleod, J. J. R. Insulin. *In Encyclopedia Britannica.* Chicago, Encyclopedia Britannica, Inc., 1942, vol. 12, p. 451.
14. Best, C. H. *Diabetes and insulin and lipotropic factors.* The Beaumont Lecture. Springfield, Ill., Charles C Thomas, 1948.
15. Ssobolew, L. W. Zur normalen und pathologischen Morphologie der inneren Secretion der Bauchspeicheldrüse. *Virchows Arch.* 1902, *168*, 122.
16. DeWitt, L. M. Morphology and physiology of areas of Langerhans in some vertebrates. *J. exp. Med.*, 1906, *8*, 193.
17. Scott, E. L. On the influence of intravenous injections of an extract of the pancreas on experimental diabetes. *Amer. J. Physiol.*, 1912, *29*, 306.
18. Murlin, J. R., Clough, H. D., Gibbs, C. B. F., and Stokes, A. M. Aqueous extracts of pancreas. I. Influence on the carbohydrate metabolism of depancreatized animals. *J. Biol. Chem.*, 1923, *56*, 253.
19. Pratt, J. H., Lamson, P. D., and Marks, H. K. The effect of excluding pancreatic juice from the intestines. *Trans. Assoc. Amer. Phys.*, 1909, *23*, 266.
20. Banting, F. G. and Best, C. H. The internal secretion of the pancreas. *J. Lab. Clin. Med.*, 1922, *7*, 256.
21. Roberts, F. Insulin. *Brit. med. J.*, 1922, *2*, 1193.
22. Zuelzer, G. Experimentelle Untersuchungen über den Diabetes. *Berl. klin. Wschr.*, 1907, *44*, 474.
23. Zuelzer, G. Über Versuche einer specifischen Ferment-therapie des Diabetes. *Z. exp. Path. Ther.*, 1908, *5*, 307.
24. Zuelzer, G., Dohrn, M., and Marxer, A. Neuere Untersuchungen über den experimentellen Diabetes. *Dtsch. med. Wschr.*, 1908, *34*, 1380.
25. Forschbach, J. Versuche zur Behandlung des Diabetes Mellitus mit dem Zuelzerschen Pankreashormone. *Dtsch. med. Wschr.*, 1909, *35*, 2053.
26. Banting, F. G., Best, C. H., and Macleod, J. J. R. The internal secretion of the pancreas. *Amer. J. Physiol.*, 1922, *59*, 479.
27. Banting, F. G. The history of insulin. *Edinb. med. J.*, 1929. *36*, 1.
28. Collip, J. B. The original method as used for the isolation of insulin in semipure form for the treatment of the first clinical cases. *J. biol. Chem.*, 1923, *55*, XL.
29. Allen, F. M. Discussion of paper by Banting *et al. Trans. Assoc. Amer. Phys.*, 1922, *37*, 337.
30. Collip, J. B. The history of the discovery of insulin. *Northw. Med.* (*Seattle*), 1923, *22*, 267.
31. Collip, J. B. Frederick Grant Banting. *Sci. Monthly* (*Wash.*), 1941, *55*, 472.

Some Variant Theories in Opposition to the Germ Theory of Disease

PHYLLIS ALLEN RICHMOND*

THE rapid development of the germ theory in the mid-nineteenth century, combining as it did work in several different lines, met with opposition from many quarters. Some of the opponents received a great amount of attention in America. These were primarily British, although a few French writers were also considered. Practically nothing of the German or other Continental research penetrated medical publications of the United States. References to so great a scientist as Jacob Henle are strangely missing in American literature on etiology.[1] Apparently most Continental contagionists who supported the germ theory might have been living on the moon so far as Americans were concerned. This situation may have stemmed partly from language barriers and partly from difficulties inherent in the germ theory itself.

The problems involved in proving the theory were complicated. First it was necessary to see the micro-organisms suspected of causing disease, and then to produce sickness from them.[2] Many medical men had spurned the animalcular hypothesis because the existence of the organisms had not been demonstrated. Men who called themselves scientists could not be expected to accept things on faith. Although microscopes were strong enough to reveal micro-organisms after about 1825, techniques of staining and methods of obtaining pure cultures were not yet developed.

As for the experiment of producing disease from microbes, this was contingent upon the acceptance of the first assumption. One had to admit there was something tangible to be transferred, either animalculae or poisons. While those supporting the idea of a living contagion were, of necessity, contagionists, only a few contagionists were also animalculists. Furthermore, it was necessary

* Rochester, New York.

[1] For a brief discussion of the *contagium vivum* theories to 1850, American animalcultists, other theories of disease causation in the early nineteenth century, and the general development of the germ theory in the mid-century, see Phyllis Allen, *Americans and the germ theory of disease*, Ann Arbor, University Microfilms, 1949 (Doctoral dissertation, University of Pennsylvania), Chap. 1-5, pp. 1-126. See also Charles Singer, *The development of the doctrine of contagium vivum 1500-1750*, London, 1913; and William Bulloch, *History of bacteriology*, London, 1938.

[2] Kisskalt, Karl. *Theorie und Praxis der medizinischen Forschung*. 2d ed. Munich and Berlin, 1944, p. 58.

to be sure that the disease produced was the same as the original disease. If the inoculated person or animal did not die and therefore no autopsy could be performed, one could not always determine with certainty whether the disease produced in the second instance was the same as that in the original case. Koch's great contribution was that of recovering the micro-organisms between inoculations and cultivating them again, thus proving that the same organism produced the same disease in each case. In this way he guarded against the possibility of getting contaminated material and the introduction of new organisms. Such details were important, because the criticism of those who opposed the germ theory forced those attempting to prove it to work with very great care.

Among the major opponents of the germ theory were the men who supported the doctrine of spontaneous generation. The adherents of this ancient and widespread belief thought that germs could arise *de novo*, without parents, producing disease, which was then propagated from person to person by contagion. Such a view would account for the prevalence of sporadic cases between epidemics, and it would explain the sudden beginning of an epidemic without apparent cause.

It is not necessary to go into detail regarding the spontaneous generation controversy, as this has been well done in William Bulloch's *History of bacteriology*.[3] By the nineteenth century, the theory of spontaneous generation had become elaborated into that of heterogenesis. This new and more accurate title implied the generation of living things from two main sources. The first suggested a mechanistic approach: "living matter may be produced by spontaneous generation of animal or dead matter without the agency of any previous living things." Henry Charleton Bastian, a British scientist whose views were extremely popular in America, called this archebiosis. The second view involved a vitalistic concept found in two forms: living things may be formed (i) as a result of dissociation of parts of previous livings now dead," or (ii) by physiological action of a living organism which transmits the vital principle without its organic characters." The whole concept became greatly elaborated and involved.[4]

[3] The material on spontaneous generation is drawn from Bulloch, *op. cit.*, pp. 67-119, except where otherwise noted.

[4] Bulloch, *op. cit.*, p. 79. The mechanist-vitalist interpretation is the author's, not that of Bulloch; see H. Charleton Bastian's *The beginnings of life: being an account of the nature, modes of origin and transformations of lower organisms*, London, 1872, vol. 1, p. 252 (chart).

During the nineteenth century, experimentation to prove or disprove the doctrine was undertaken. Franz Schulze, Theodor Schwann, and other biologists made improvements in technique and achieved some success in purifying the air passing into their more or less sterile solutions. A period of most intense controversy began soon after F. A. Pouchet presented his results to the Académie des Sciences in 1858.[5] Pouchet came to the conclusion that life arose spontaneously in solutions of organic material, under the influence of pre-existing life, retaining the properties of the original organisms. Thus the vital principle was transmitted somehow through a solution composed of organic matter, formerly organized but now decomposed and ready for the formation of new life. This vitalistic viewpoint was opposed by Bastian, who adopted a mechanistic concept: life arose from non-living material by a new combination of molecules. In Bastian's system, life could come from a mineral or inorganic solution.[6] Bastian might well have seized upon the crystallization of viruses as proof of his idea if such information had been available to him.

Pouchet realized that the real problem in spontaneous generation was to determine whether or not germs existed in the air. He repeated the experiments of Schulze and Schwann, but obtained diametrically opposite results. His conclusions were opposed by Claude Bernard and others, and his methods were criticized by Louis Pasteur. Pasteur eventually proved that germs existed in the air and that these contaminated "sterile" solutions, thus accounting for the apparent "spontaneous generation." He presented a series of masterly experiments before the examining commission of the Académie des Sciences in 1862 and decisively established his position, triumphing over Pouchet and his associates.

Though Pasteur's experiments drove Pouchet from the active field of battle, others took his place. Some of these people drew their conclusions from results obtained by using imperfect techniques in experimentation and promptly became converts to heterogenesis on the basis of such incorrect evidence. John Hughes Bennett, Professor of the Institutes of Medicine at Edinburgh, and possibly the Harvard University comparative anatomist, Jeffries

[5] Mémoires sur les corpuscles organisés qui existent dans l'atmosphère. Examen de la doctrine de générations spontanées. *Ann. chim. phys.*, 3. sér. 1862, *64*, 5-110, also *Ann. Sci. nat.*, 1861, *16*, 5-98.

[6] The germ theory of crystallization which appeared about this time was a sort of reversal of archebiosis. This theory had a germ act as a ferment and initiate crystallization in chemical solutions. It is rather interesting as an indication of the intellectual climate of the mid-nineteenth century (cf. Bastian, *op. cit.*, vol. 1, p. 301).

Wyman, fit into this category. The prize example was Charleton Bastian, who fought on for his views until his death (1915), long after his contemporaries had acquiesced to the principle that all living things have parents. Emile Duclaux, one of Pasteur's coworkers, praised the work of Bastian in opposing Pasteur because his objections were well founded in many instances, and Pasteur was forced to improve his own methods as a result of them.[7]

Bastian also spurned the findings of the physicist, John Tyndall. His opposition to Pasteur and Tyndall was especially significant because of his influence in American medical circles. Tyndall, who investigated the floating particles in the air as a problem in physics, was drawn into the spontaneous generation controversy by his discovery that a flame burned up the "dust" in the air and left an optically dark space in a beam of light. A space which was dust free and germ free was optically empty. Tyndall then performed a series of experiments in which he showed that infusions remained sterile unless contaminated by dust and germs from the air. In the process he had to develop a technique similar to modern asepsis. To keep his infusions free from contamination, the walls and floor of the room where he worked were scrubbed down, and he dressed himself and his assistants in especially clean overalls. He was able to show that at times the heat needed to sterilize the infusion in a flask (not the air in it) had to be prolonged over a much longer period than previously had been used. This led him to the conclusion that bacteria went through different phases of development.

Ferdinand Cohn confirmed this conclusion and demonstrated the resistance of the spore. His finding dealt the death blow to the doctrine of spontaneous generation. Cohn showed that Bastian's experiments illustrating apparent heterogenesis with turnip and cheese infusions proved, *not* the idea of spontaneous generation, but the unusual resistance which spores of these bacilli offered to heat. From this time on, any experiment carried out with proper precautions should have disproved the idea of heterogenesis. When the matter was reopened by the crystallization of a virus, it assumed a different form. The question now became one of determining whether the viruses were possible links between the organic and inorganic worlds, which suggests Bastian's *archebiosis* rather than spontaneous generation proper.

[7] A similar service was done for bacteriology by Rudolf Virchow in his emphasis on the part played by the host in infection. See Alfred Plaut, Virchow and today's physicians and scientists, *Bull. Hist. Med.*, 1953, 27, 246-47.

In addition to the spontaneous generation conflict, there were other forms of opposition to the germ theory. These were not as dramatic or as much publicized as the affair of heterogenesis, but they were probably just as important in illustrating general attitudes towards the theory.[8] Many books of this opposition were reprinted in America, especially the ones by English authors.

The theory of the Bavarian epidemiologist Max von Pettenkofer received considerable attention. Pettenkofer's views, which related mainly to intestinal diseases, were based on an impure soil as the x-factor in epidemics. In cholera, for example, he reasoned that the victim's excreta acted as a leaven upon a certain form of porous soil in the neighborhood of human dwellings, and the special poison of cholera was a miasma produced by such fermentation. When Koch's vibrio was shown to be the specific agent in cholera, Pettenkofer adapted his theory to the new conditions and announced that the vibrio was innocuous when leaving its human host, but became virulent in the requisite soil formation.[9] His ideas earned him wide publicity and were especially well-received in America.

Other writers presented views of their own which were not entirely divorced from the germ theory. All this confusion of theory and counter-theory was not diminished in any way by the inadequate terminology used at the time. Lack of clarity in ideas on bacteria provoked Bastian to make the following comment:

> The most discordant opinions have always existed as to the nature of these Bacteria. Naturalists have been in doubt as to whether they should be regarded as independent living beings of the lowest grade, having an individuality of their own; or whether, rather, they should be looked upon as developmental forms of some higher organisms—either animal or vegetal. There seem to be four principal views concerning them:—(1) that they are animal organisms of the lowest grade, having an individuality of their own, as conjectured by Ehrenberg; (2) that they are, as supposed by Hallier, of the nature of spores, produced from, and destined again to develop into, some of the simplest microscopic fungi; (3) that they represent, as Cohn thinks, the later free-swimming stage in the existence of certain algae, intermediate between Palmellae and Oscillatoriae; or lastly (4) that they are the first and more common developmental phase of newly evolved specks of living matter, which are capable, either singly or in combination, of developing into many kinds of living things.[10]

[8] Stern, Bernhard J. *Society and medical progress.* Princeton, 1941, pp. 194-202.

[9] Hume, E. E. *Max von Pettenkofer, his theory of the etiology of cholera, typhoid fever and other intestinal diseases: a review of his arguments and evidence.* New York, 1927, pp. 45-106.

[10] Bastian, *op. cit.*, vol. 1, pp. 268-70.

In considering Bastian's remarks on contemporary views on bacteria, it should be noted that the idea that all living things have parents *of the same species as themselves* had not yet been accepted. Hence many of the concepts of bacteria considered them as earlier stages in the development of higher organisms. This is another reason why the work of Koch, in demonstrating the complete life cycle of the anthrax bacillus, was so important. The notion of the interchangeability of species had to be destroyed in the process of building the science of bacteriology.

Probably one of the most interesting of all the variants of the idea of living contagion in disease was the zymotic theory. It will be remembered that there was already in existence the view that the animalculae were a ferment or catalyst, producing the poison causing disease, but not themselves the specific causal factor.[11] The zymotic theory began with the concept that a real chemical catalyst was the agent, but it soon became apparent that this catalyst was endowed with unusual powers. Rejecting the animalculae as agents, the zymoticists finally settled on a ferment or "zyme" of unknown composition—one zyme to each disease—capable of reproducing itself in the human body and, after an incubation period, of producing disease. In other words, the zyme acted as a living organism and not as a mere chemical catalyst. This was a reiteration of the earlier view of the French chemist Guyton-Morveau;[12] and, in fact, it will be seen at once that the zymotic theory of disease was but a nineteenth century continuation of the virus-like line of development of the *contagium vivum* doctrine.[13]

One of the earliest zymoticists was the English epidemiologist William Farr, who, in the *Registrar-General's Report on Cholera*

11 Allen, Phyllis. Etiological theory in America prior to the Civil War. *J. Hist. Med.*, 1947, 2, 509-10.

12 Guyton-Morveau, Louis B. *Traité des moyens de désinfecter l'air, de prévenir la contagion, et d'en arrêter le progrès.* Paris, 1801, pp. 232-34, paragraphs 145-46.

13 Allen, *op. cit.* (note 1), Chap. 3. The contagium vivum doctrine itself had developed along two separate lines even before the early nineteenth century. These two aspects were based on differing views of the nature of the causal factors. On one hand, the otherwise inanimate atoms of contagion were believed to be capable of rapid reproduction only within a human body, like a virus, but their exact composition was open to conjecture. On the other hand, there was the idea that disease resulted from the presence in the body of minute living plants or animals, commonly called animalculae. These organized forms of life were animate both in and out of the body. Dr. C.-E. A. Winslow has pointed out in his discussion of Fracastoro's views on contagion that these were better applied to virus diseases than to bacterial infections (*The conquest of epidemic disease*, Princeton, 1944, pp. 131-43). The same type of causal factors were outlined by Fracastoro's followers: Richard Mead, 1720; Jean Astruc, 1736; James Tytler, 1799; L. B. Guyton-Morveau, 1801. The virus-like view was important in furthering the notion of one specific causal factor for each disease, a point lost to all the animalculists except M. A. Plenciz, 1762, and Jacob Henle, 1840.

for 1848-49, outlined the zymotic principles. His scheme is worth reproducing because of its whole-hearted adoption of the doctrine of causal specificity (the zymes are in the third column):[14]

ZYMOTIC PRINCIPLES

Small-pox	variola	varioline
Cow-pox	vaccinia	vaccinine
Glanders	equinia	equinine
Hydrophobia	lyssa	lyssine
Syphilis	syphilis	syphiline
Infection in dissecting	necusia	necusine
Erysipelas	erysipelas	erysipeline
Puerperal fever	metria	metrine
Measles	rubeola	rubeoline
Scarlet fever	scarletina	scarletine
Whooping cough	pertussis	pertussine
Dysentery	dysenteria	enterine
Diarrhoea	diarrhoea	
Cholera	cholera	cholerine
Influenza	influenza	influenzine
Typhus	typhus	typhine
Plague	pestis	pestine

The existence of gangrenine, ergotine, ophthalmine, tetanine, miliarine, diphtherine, parotine, aphthine, tracheine may also be admitted.

It should be emphasized that this differentiation among specific causes appeared before any general distinction was made among *germs,* except by Jacob Henle. Farr's interpretation of the zymotic theory followed Liebig's views on the nature of yeast and other ferments. Liebig believed that a specific enzyme-like chemical poison was responsible for each disease or collection of symptoms; and all infectious disease was therefore viewed as a kind of fermentation — initiated by the zyme but symptomatically due to

[14] [Great Britain, Registrar-General.] *Report on the mortality of cholera in England 1848-49.* London, 1852, pp. lxxx-lxxxiii, chart on p. lxxxi. This was written by William Farr. The part on the zymotic theory was originally published in the *Fourth annual report of the Registrar-General,* Appendix, pp. 199-205. See also Thomas Herbert Barker, *On malaria and miasmata and their influence in the production of typhus and typhoid fevers, cholera, and the exanthemata: founded on the Fothergill Prize Essay for 1859,* London, 1863, pp. 31-32. Dr. Wilson G. Smillie, in his chapter, "The period of great epidemics in the United States (1800-1875)" in *The history of American epidemiology* (Franklin H. Top, Ed., St. Louis, 1952, pp. 53-54) writes: "The zymotic diseases were believed to be due to a fermentation of the tissues and always produced by some external stimulus. This stimulus was cosmic in origin and was almost always transmitted through the air. The miasma might be produced by man himself, by the products of his household, or by any type of decaying animal or vegetable matter, or by cosmic phenomena." The first sentence correctly defines "zymotic," though the action of the zymes was not limited to the tissues. In the elaboration, however, he has added as further definition the miasmatic and atmospheric hypotheses, which were separate ideas and had little relation to the zymotic theory.

chemical changes in the blood and other body fluids. His specific ferment did not multiply but acted as a catalyst.[15]

Farr's ideas were modified by his successors. Winslow has shown the gradual change in John Simon's views from a zymotic theory similar to Farr's into one closely approximating the germ theory.[16] Thomas Herbert Barker, an English physician whose book (with the misnomer *On malaria and miasmata*) contains an excellent discussion of all the etiological theories available in the early 1860's, also preferred a germ-zymotic hypothesis. The zymotic concept is best illustrated by the six rules Barker formulated to explain it:

1. Specific epidemic diseases are derived from specific poisons, poisons reproductive in the animal economy, and reproductive possibly out of the animal economy, under conditions favourable to reproduction.

2. Such specific poisons received into the blood, whether by a wound in the skin, or by absorption from mucuous surface, produce the same specific effects.

3. The amount of poison is of little moment, when taken into consideration with the force of reproduction.

4. The poisons are diffusible only to a limited extent; for, if they be gases, the diffusion process in the atmosphere disperses them; while if they be organic particles they float but for small distances, and remain active or inactive according to the medium with which they come in contact.

5. Meteorological influences do not assist in the diffusion of these poisons, but rather in the reproduction of them—inasmuch as those conditions of a meteorological kind are evidently connected with the prevalence of epidemics, such as high temperature, would rather favour the dispersion and removal of volatile poisons than their concentration and intensity.

6. As a consequence of the last named position, matters on the earth exclusive of man, may be a constant storehouse of these poisonous agencies; the poisons may thus lie dormant for a time, like the seeds of a plant; at favourable seasons they may rise unto full activity, and man subjected to their influence, may become the vehicle of their reproduction and of their further transmission.[17]

This passage has been inserted in spite of its length because it is interesting to see exactly what the zymotic theory included in 1863. The relationship between this concept and modern virology is apparent if one substitutes the word "virus" for "poison" throughout, though, of course, the views expressed are not entirely those of present-day virology.

American interest in the zymotic theory seems to have been ephemeral. The terminology was taken over, but in an altered in-

15 Barker, *op. cit.*, p. 35.
16 Winslow, *op. cit.*, pp. 259-66.
17 Barker, *op. cit.*, pp. 86-87.

terpretation to fit the miasma hypothesis.[18] The pages of Alfred Stillé's copy of the Barker book, at present in the Main Library of the University of Pennsylvania, were cut for the first time in 1948. Evidently Stillé, an animalculist in the 1840's, had lost interest in etiological theory to such a degree that by the later 1860's he did not even read books on the subject in his own library.

In the latter part of the nineteenth century, William Sedgwick, of public health fame, drew a very apt analogy between the fermentation of apple juice and the course of an infectious disease:[19]

THE GERM OR ZYMOTIC (FERMENT) THEORY OF DISEASE

A Fermentation (apple juice)	An Infectious Disease (smallpox)
1. Exposure of the juice to air, dust, etc.	1. Exposure of the patient to infection.
2. Repose and then slow change (growth of the ferment).	2. Incubation (slow and insidious progress of the disease).
3. Active fermentation or "working." Evolution of gas bubbles, change of sugar to alcohol.	3. Active disease. Eruption, disturbance of the usual functions. Rise of the temperature or fever.
4. Gradual cessation of fermentation.	4. Slow convalescence or death.
5. No further liability to alcoholic fermentation.	5. Immunity to smallpox.

In this case no differentiation was made between the germ and zymotic theories, which illustrates how close the two eventually became in their relationship. The fact that a virus disease was chosen in illustration of the point is doubly interesting.

It was more usual to find the zymotic theory posed as an alternative or even a rival to the germ theory. There seemed to be no meeting place for the two. As the germ theory became better understood, however, and more work was done on it, the zymoticists gave their ferments an organic body similar to the yeasts, and gradually the two theories merged. After the acceptance of the germ concept, the other hypothesis dropped out of medical literature, or the terms "zymotic" and "germ" were used interchangeably. The zymotic idea itself, with its ferments of inert material capable of

[18] Christian, E. P. On the epidemic relationship of zymotic diseases. *Amer. J. med. Sci.*, 1862, *44*, 91-95; Shurly, E. L. The poisons giving rise to the miasmatic order of zymotic diseases; their relationship. *Detroit Rev. Med. Pharm.*, 1876, *11*, 410-19; Gibbs, B. F. Portagious, the proper word to describe the etiology of certain zymotic diseases. *Med Rec. (N. Y.)*, 1880, *18*, 385; Kunkler, E. A. On the zymotic or fermentative affections. *Pacif. med. surg. J.*, *23*, 49-59; etc.

[19] [Sedgwick, W. T.] *Sedgwick's principles of sanitary science and public health.* Rewritten and enlarged by Samuel C. Prescott and Murray P. Horwood. New York, 1935, p. 26.

reproduction only within a living organism, appeared to have no significance in bacteriology.

This turned out to be an erroneous assumption. The discovery of the ultramicroscopic viruses (1892), followed eventually by the crystallization of the virus of tobacco mosaic (1935), raised the still-debated question of the exact nature of the viruses. No attempt will be made to settle that question here, but it should be observed that the factors of virus reproduction and adaptation to environment make them resemble the zymes of the earlier zymotic hypothesis. In fact, the intellectual relationship between this theory and the current views on viruses is quite apparent now.

Another interesting variant of the germ theory appeared in 1861 in the work of Horace Dobell, an English physician. Dobell came to the conclusion that the vestiges of one disease became the germs or seeds of the next. He compiled a series of charts to show the interdependence of various diseases and, by what was mainly a symptomatic analysis, he connected the remains of one disease with the beginnings of another. For example, he noticed that abortion may be caused by syphilis, so he reasoned that the vestiges of one disease, syphilis, were the cause of another "disease," abortion. One wonders how he knew the syphilis had been cured. In the case of typhus, typhoid, and other "continued" fevers, the essential antecedent was "a poison in the organism either arising in the individual attacked or communicated from another." The causes of these essential antecedents of such diseases were chiefly "conditions of life—overcrowding; destitution; imperfect ventilation; exposure to emanations from decaying organic matter; organic impurities in drinking-water; and other defects in the conditions of life."[20] In spite of calling his book, *Lectures on the Germs and Vestiges of Disease,* Dobell apparently had no intention of using the word "germ" in the restricted sense common to his day. To him *germs* were the poisonous remnants of one disease ready to produce another.

An odd theory in opposition to the germ theory was developed by Lionel S. Beale of King's College, London, in the 1870's. His conjecture was that disease was caused by a contagious *bioplasm,* which had the following properties: it was a minute particle, specific for each disease, derived from normal protoplasm. A living, growing contagion, it developed in the blood, body fluids, and tissues. It was small enough to pass through the walls of these tissues

[20] Dobell, Horace. *Lectures on germs and vestiges of disease and the prevention of the invasion and fatality of disease by periodical examinations.* London, 1861, pp. 92-101, 73.

and the capillaries, but "*not* in the nature of bacteria or akin to any low form of organism." The concept of bioplasm needs clarification, for this was the crux of Beale's whole hypothesis. Normal bioplasm was the living protoplasm of the human body. When this material was changed, by some alteration in the vital processes, it became corrupted and gave rise to disease. This altered material he called "disease germs," nicely confusing the terminology of his day. Beale seems to have mistaken the bodily changes which result from the actions of micro-organisms—for instance, the mucus produced by the common cold—for the causes of the disease itself.[21] His bioplasm concept is extremely difficult to grasp because it is so intangible. It was primarily a vitalistic idea and evidently fared badly at the hands of his contemporaries.

Beale's opposition to the germ theory grew more and more pronounced with each succeeding edition of his book, *The Microscope in Medicine;* and by the fourth edition (1878), he was really violent. In attacking first the spontaneous generation advocates and then the germ theorists, he wrote:

> It is curious to observe how very easily in these days an untenable doctrine may be forced into notoriety, and taught far and wide as if it were actually demonstrated truth. A few authorities perhaps in Germany graphically portray what they please to call the results of observations, and after marshalling before the reader certain facts and arguments, remark that the evidence is perfectly conclusive in favour, say, of the view that certain contagious diseases are due to microzymes. Papers, with "new observations," soon follow, and confirm the original statement in every particular. Pupils, friends, admirers, accept and diffuse the new doctrine. Abstracts and memoirs multiply, and the conclusions arrived at abroad are supported and promulgated here, under the patronage of a government official, and published in a blue book. Those unacquainted with the art and mystery of transforming arbitrary assertions into scientific conclusions are easily convinced that the whole scientific world is agreed upon this one question at any rate, while in point of fact the speculative and far-fetched arguments would not have withstood careful and intelligent examination.[22]

Beale's unhappiness over the pressure being brought upon heretics to support the germ theory may in part have had a personal basis. The blue book mentioned was John Simon's *Report of the Medical Officer to the Privy Council* for 1874 in which Burdon Sanderson published an abstract of the current work on bacteriology. The amusing part about the whole affair is that Simon and

21 Beale, Lionel S. *The microscope in medicine.* 4th ed. Philadelphia, 1878, pp. 319-21. Idem. *Disease germs: their real nature. An original investigation.* London, 1870, p. 152. Idem. *The mystery of life: an essay in reply to Dr. Gull's attack on the theory of vitality in his Harveian Oration for 1870.* London, 1871, pp. 49-50.

22 Beale, *op. cit.,* p. 286.

Sanderson were not at this time wholehearted advocates of the germ theory of disease, and both exercised considerable caution in presenting it to the public.[23] Beale's bioplasm theory was an interesting possibility when it was first presented in the 1870's, but as evidence mounted in favor of the germ theory it became outdated. None the less, Beale, together with his American following, closed his eyes dogmatically to any opposition and so awoke to find himself in an untenable position by 1880. The rest of his microscopy book was a satisfactory text.

About the time that Beale was expounding his views, another Briton, John Dougall, published a little pamphlet in which he announced that germs were not the cause of putrefaction as was beginning to be believed, but rather they prevented it. Germs were beneficial.[24] This was an interesting point, although Dougall carried it a bit too far.

A more unusual theory was presented by James Ross, also British, who applied Darwin's work to the germ theory. He accepted the germ theory to some extent, but also conjectured that portions detached from a living body might be particles of contagion—in preference to living germs. His *graft theory* embodied the view that diseases such as smallpox and scarlet fever "may have descended by successive slight variations from a disease which was different from both, but which presented characters intermediate between them."[25]

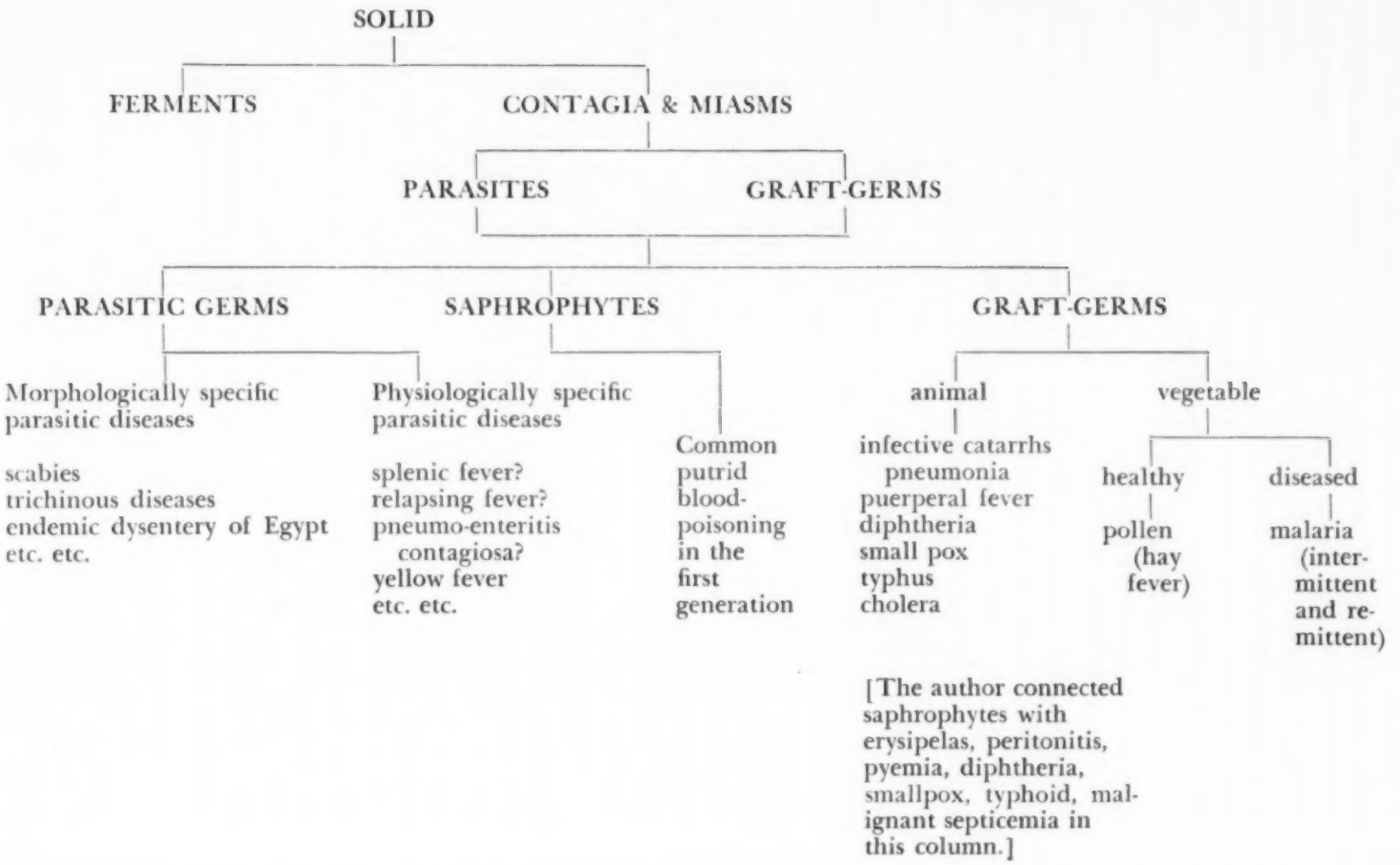
This hypothesis was modified by a third English writer, John Drysdale, in his treatise, *Germ Theories of Infectious Disease*. Drysdale accepted the germ theory for some diseases, and a graft-germ theory, based on the work of Beale, for others. The graft idea meant that diseases were due to transplanted particles of living, detached matter (bioplasm or degraded protoplasm) grafted onto a new body. The author preferred this explanation for diseases which we now know are caused by viruses, though the choice was probably accidental. Drysdale's elaborate chart is reproduced herewith (Fig. 1), in abridged form, to illustrate his subject. This chart shows the intermediate position it was possible to take with regard to the specific causal factors in infectious diseases. Drys-

23 Beale practically admits this in his footnote on page 286.

24 Dougall, John. *On the relative powers of various substances in preventing the generation of animalculae or the development of their germs; with special reference to the germ theory of putrefaction.* London, 1871, pp. 19-25.

25 Ross, James. *The graft theory of disease, being an application of Mr. Darwin's hypothesis of pangenesis to the explanation of phenomena of the zymotic diseases.* Philadelphia, 1872, p. 267.

Fig. 1. John Drysdale, *The Germ Theories of Infectious Diseases,* frontispiece (abridged).



dale, as may be seen from his question marks, was still not convinced that the correct explanation had been given in the cases of anthrax (splenic fever) and relapsing fever. The connection he made between the saphrophytes and septic diseases is interesting and self-explanatory.[26] All in all, the work of Drysdale forms an enlightening link in the chain leading to the acceptance of the germ theory.

The development of the germ hypothesis from the animalcular view into a scientific explanation of the specific causal factors in infectious disease did not take place without considerable controversy and argument. The parts of this argument which have been discussed here were only a fraction of the whole controversy, but these were the segments which, for better or worse, found their way into American medical literature. Often the criticism was made by scientists whose researches led them to honest but mistaken conclusions. In other cases it was the result of a man's desire to establish a pet theory. Whatever the origin, the consequence of the arguments was to place the germ theory on a sound basis by forcing its proponents to seek answers to questions which they might have ignored. Opposition by scientists to the theory *per se* began to disappear by the late seventies, and in the early 1880's there was little questioning of it.

ACKNOWLEDGMENT

The author would like to express her thanks to Dr. Richard H. Shryock for helpful advice and encouragement in making this study.

[26] Drysdale, John. *The germ theories of infectious diseases.* London and Liverpool, 1878. *Passim.*

The Curious Obscurity of Dr. James Lind

A. P. MEIKLEJOHN*

THOSE who attended the Lind Bicentenary Celebrations in Edinburgh on 22 and 23 May 1953 probably came away wondering why they had never before heard much about James Lind, M.D. (1716-1794). After reading the reprint[1] of his classic, *A Treatise of the Scurvy*, they may be even more surprised. Lind has hitherto been a comparatively obscure figure in the history of medicine; his proof that citrus fruits cure scurvy is often erroneously attributed to the celebrated Captain James Cook, R.N.; textbooks of nutrition either omit any mention of him or, in the case of one recent text, refer to him briefly as an "Englishman," which is not a tactful way of describing a Scot. Yet a modern assessment[2] of his work by a distinguished naval officer, Surgeon Vice-Admiral Sir Sheldon Dudley, R.N., F.R.S., can leave little doubt that he was one of the great thinkers of eighteenth century medicine. A curious obscurity has hidden the true merits of this remarkable man for two centuries. The apparent explanation is that he was not thought important in his own day—he was not a popular figure.

History depends too much on the news headlines of the past. Trivial incidents and trivial men become immortalized in history books through the accident of having in their day excited public attention. A notable example took place in Scotland just twenty-five years before Lind's birth in Edinburgh—the Massacre of Glencoe. As an event it was a picayune affair; bigger and more terrible massacres, still fresh in Highland memories of the time, had been accepted as commonplace before. But because it was used by the Tories as a convenient political squib for heating the Royal Throne, every British schoolboy is still expected to learn about it.

Lind never "made the headlines." Though his three remarkable books went through several editions in his lifetime and were translated into other languages, it is doubtful if they were ever "best sellers." He received few honors and was never elected a Fellow of the Royal Society like his sociable but now forgotten cousin of the same name. From an age of great portrait-painting, the only pic-

* Department of Medicine, University of Edinburgh.

[1] Lind's Treatise on Scurvy, a Bicentenary Volume containing a reprint of the First Edition of *A Treatise of the Scurvy* by James Lind, M.D. with additional notes; edited by C. P. Stewart and Douglas Guthrie. Edinburgh, at the University Press, 1953. 440 pp.

[2] Dudley, Sir Sheldon. *Proc. Nutrition Soc.*, 1953, *12*, 202.

ture left of him is a single copy of an engraving made from a painting by an obscure, dispossessed Jacobite baronet. The original is lost, probably because no one thought it worth preserving.

It is easy to say that Lind was so far ahead of the ideas of his time that his work was not appreciated; there is obviously more to it than that. A different type of man might have publicised as well as published his views, and carried his contemporaries forward with him. The suspicion must remain that neither Lind nor his ideas were particularly popular among the leading medical men of the day. At least part of the reason is perhaps to be found in the character and influence of two contemporaries who were also authorities on scurvy—Anthony Addington and Charles Bisset.

Anthony Addington (1713-1790) was a Wykhamist and Oxonian, a very different breed from the Scot, James Lind. He came from a Berkshire county family and was educated at Winchester School and Trinity College, Oxford. After taking his M.D. in 1744, he settled in practice at Reading, making a specialty of mental diseases. It does not appear that he ever went to sea, or had any first-hand experience of scurvy, nevertheless in 1753 (the same year as Lind's Treatise) he published *An Essay on the Sea-scurvy: wherein is proposed an easy method of curing that Distemper at Sea, and of preserving Water sweet for any Cruize or Voyage.* This work is an excellent example of the armchair medical learning of the day. Addington had clearly read and studied the authoritative opinions of the previous masters. The kind of sense he made from them can be judged from the following passage from his *Essay.*

> In the last stage, which is contagious, it (scurvy) produces horrors of imagination; trembling, fainting, convulsive, epileptic fits; weakness of memory and reason, lethargies, palsies, apoplexies; purple, livid and black spots; violent effusion of blood from every internal and external part of the body; putrid fevers, hectic, continued and intermittent; exquisite rheumatic pains, pleurisies, the jaundice, obstinate costiveness, colics, vomiting, diarrhoeas, dysenteries, mortifications.

His method of cure was seawater, both for internal and external use, with frequent blood-letting for patients with haemorrhages. His method for preserving drinking water was the addition of hydrochloric acid.

Addington's *Essay* was published shortly before Lind's book, so the latter had time to include in his bibliography a review of it which begins: "The description [Addington's] of the disease is borrowed from Cockburn, Boerhaave, Hoffman, Eugalenus, Lord Anson's voyage, &c." This is typical of Lind's fearless criticism;

but it is the kind of comment that is not enjoyed by the victim, and Addington was a man of influence. Some hint of this is already to be seen in the dedication of his *Essay;* it is addressed to all seven of the Lords Commissioners of the Admiralty, mentioned individually by name. It is quite possible that one or more of them knew Addington personally, perhaps from Oxford days.

A year after publishing his *Essay,* Addington moved to London where he was soon elected a Fellow of the Royal College of Physicians, to whom he delivered the Goulstonian Lectures in 1757. As a practitioner he was remarkably successful; Lord Chatham became his patient and also the Younger Pitt, to whom he gave the dubious advice to drink port wine for his health's sake. His reputation as a mental specialist led the Prince of Wales to ask him to examine George III in 1788 and report on his condition. Like Dr. Stockmar in a later generation, he acquired an influence in the affairs of State beyond the sphere of medicine. His son became Speaker of the House of Commons. Though there is no record of his opinion of Lind, it was unlikely to have been favourable and somewhere, at some time, this might well have told against Lind.

The relations between Lind and Charles Bisset (1717-1791) are clearer. Bisset was born near Dunkeld in Perthshire and studied medicine in Edinburgh at the same time as Lind; perhaps there was some student rivalry between them. Like Lind, and unlike Addington, he had some practical experience of scurvy at sea. In 1740 he was appointed second surgeon to the Military Hospital in Jamaica and the following year sailed in *H.M.S. Kent* on Admiral Vernon's expedition to Porto Bello. (Admiral Vernon, by the way, was known as "Old Grog" from the waterproof grogram coat he constantly wore; he ordered that his sailors should drink their rum watered, and so gave his name to "grog"). Bisset certainly saw plenty of scurvy during this time, but did not distinguish it from other diseases with the same clarity as Lind. He was invalided home in 1745 and in the intervals of the busy years that followed was leisurely engaged in writing "a considerable work" on the diseases of the West Indies when Lind's Treatise appeared. Thereafter he curtailed the scope of his work, prompted, according to his own account, by the threat of another war, and wrote instead *"A Treatise on the Scurvy, designed chiefly for the use of the British Navy"* (1755). It was published two years after Lind's *Treatise* and was clearly designed to refute it, at least in some particulars.

Bisset's *Treatise* begins very much like Lind's with its dedication to Lord Anson "and the rest of the Lords Commissioners," and its introduction pointing out that "the healths and lives of seamen are of the greatest value to the state"; but for the rest it is as obscure as Lind's *Treatise* is illuminating. His clinical description of scurvy is indefinite, and confused with "Malignant, Continued, Remitting and Intermitting Fevers and Fluxes." He devotes a whole chapter to "Scorbutic Ulcers" in which he appears to attribute ulcers of every description—tropical, varicose, syphilitic, etc.—to the one cause, the "scorbutic taint." His ideas about the pathology of scurvy are borrowed from the Galenical teaching of "the incomparable Boerhaave"; here is a sample:

> [The] vital powers, thus weakened [by solar heat] become unequal to the density and tenacity of the gross navy-victuals; the animal juices which they prepare from this aliment are therefore crude, viscid, light and unequally mixed: the bile, and other chylopoietic juices become too oily, and much depraved; the ingested rancid oil of meat that is tainted retains its nature, and contributed with reassumed and acrid animal oil, to increase the unequal and preternatural mixture, and depravity of the circulating juices; whence a multitude of dangerous ills. And from all these causes, a languid circulation; obstruction of the fine vessels; vitiated, and impaired secretions; diminution of perspiration; acrimony and dyscrasy of the juices; great debility of the solids: hard or soft tumours; oedematous swelling of the legs: general anarsarca: ascites: putrefaction of the obstructed gross juices, and containing vessels: ruptures of these vessels and consequent haemorrhages; foul and gangrenous ulcers: likewise transcolation of the stagnating juices, and from this, stains of different colours: or from the preceding cause, or both, and from one or more of these secondary effects, are derived all the other symptoms that attend the Scurvy.

The Lords Commissioners, if indeed they found time to read all this, may well have been impressed by the weighty prose and the author's learning, but Lind probably thought it "a great deal of rubbish."

In the treatment of scurvy Bisset comes into open conflict with Lind. He says 'Dr. Lind reckons the want of fresh vegetables and greens, a very powerful cause of the Scurvy: he might, with equal reason, have added fresh animal food, wine, punch, spruce beer, or whatever else is capable of preventing this disease." His own favourite remedy was punch.

> If brandy or rum is mixed with three-fourths of water, according to the salutary method first introduced by Admiral Vernon, it will then be gently cordial, corroborative, antiseptic, and diuretic . . . . if sugar is added to this beverage, it will be thereby rendered still more salutary . . . . and this drink it [sugar] renders more aperient, detersive, and less heating, and highly

antiscorbutic; for sugar, notwithstanding the groundless prejudice which many entertain against it, is aperient, detersive, demulcent, antiseptic, and consequently an excellent medicine against the Scurvy.

This is contrary to Lind's observation that the use of distilled spirits encourages scurvy: the experience of time has proved Lind right.

The other antiscorbutic recommended by Bisset is rice, he having discovered its "very powerful antiscorbutic and restorative qualities" at Cumberland harbour, Cuba, in 1741. Rice, as we now know, contains no ascorbic acid.

When Bisset wrote his *Treatise* he had been four years settled in highly successful general practice at Skelton, near Cleveland, Yorkshire. It seems unlikely that the Lords Commissioners of the Admiralty paid any particular attention to this essay from a general practitioner (unless some of them were friends of Admiral Vernon), but then there is no reason to think that they were especially impressed by Lind's book which preceded it. Bisset's influence was probably more important with certain medical men of the day. On page 69 of his *Treatise* he mentions some discussion with Dr. (later Sir) John Pringle, the celebrated Scotsman who introduced military hygiene. That Pringle by 1770 still had no idea how to cure scurvy is shown by his failure to save his protégé William Stark from dying of the disease, self-induced.[3] During a long subsequent life in practice Bisset continued to write papers on medical subjects and was awarded an M.D. by St. Andrews University in 1766. He carried on an active correspondence with the successful Dr. John C. Lettsom (1744-1813); no doubt the latter's birth in the West Indies was a ground of common interest. This correspondence was left to the Medical Society of London, which Lettsom founded.

It seems reasonable to suppose that there was an antipathy between Lind and Bisset: an antipathy not to be explained merely by the shy suspicion which two Scots of the same education sometimes feel for each other when they meet in a foreign land. Lind's contempt for the kind of wordy scholasticism that Bisset obviously enjoyed would in itself have been a sufficient ground for difference; but there may have been more to it than that; politically they were probably poles apart.

Bisset was obviously no Jacobite. Returning from the West Indies in 1745 when London was shaken by the advance of Bonnie Prince Charlie's Highlanders as far south as Derby, he was com-

[3] Lind's *Treatise on scurvy*, 1953 (note 1), p. 399.

missioned the next year an ensign in the 42nd Highland Regiment under Lord John Murray on the Hanoverian side. There is no evidence that he was present (like Dr. Pringle) at "Butcher" Cumberland's final defeat of the Jacobite cause at Culloden, but thereafter he served for six years under the Hanoverian Duke during various campaigns in Continental Europe and won from him recognition and promotion for his proficiency in siege engineering.

We know nothing of Lind's politics except that when the time came to have his portrait painted it was done, not by one of the great portrait artists of the day, but by a dispossessed Scottish Jacobite, Sir George Chalmers.

Conclusion

It has long been a mystery why it took the British Admiralty forty-two years to adopt the plain recommendation of Lind's *Treatise* and to supply the lemon juice which finally abolished scurvy in the British Navy. The answer perhaps is to be found in two other works on scurvy written by Lind's contemporaries: Addington and Bisset. Lind did not trouble to contest their influence; as he himself said: "The Province has been mine to deliver Precepts: the Power is in others to execute." The 'executives' were his pupils, Trotter and Blane,[4] and the latter became famous thereby, thus demonstrating the truth of Sir William Osler's aphorism: "In science the credit goes to the man who convinces the world, not to the man to whom the idea first occurs."

Biographical Note

The writer is indebted to John A. Hadley, Esq., M.B., F.R.C.S.E. of Lincoln, England for sending him an interesting volume of eighteenth century pamphlets about scurvy and related subjects. The contents of this volume include the works of Addington and Bisset referred to in this article and are as follows:

1. *Some reflections on the causes and circumstances that may retard or prevent the putrefaction of dead bodies: occasioned by an account of a body found entire and imputrid at Staverton in Devonshire, eighty-one years after its internment: in a letter to the Society of Navy Surgeons.* By J. Kirkpatrick, M.D. London, A. Millar, 1751. 40 pp. This pamphlet includes as an appendix the "Plan by the Society of Navy Surgeons" which first met on "Monday, May 7th, 1750." This appears to be the original articles of foundation of the Society.

2. *An essay on the sea-scurvy: wherein is proposed an easy method of curing that distemper at sea: and of preserving water sweet for any cruize or voyage.* By Anthony Addington, M.D. Reading, C. Micklewright, 1753. 47 pp.

[4] Lind's *Treatise on scurvy*, 1953 (note 1), pp. 399 and 400.

3. *Philosophical conjectures on aereal influences, the probable origin of diseases: with an unusual cure in the scurvy.* Addressed to Dr. Shaw, by E-m-d L-tt-n. London, Thomas Trye, 1747. 57 pp.

4. *A treatise on the scurvy. Designed chiefly for the use of the British Navy.* By Charles Bisset, Surgeon. London, R. and J. Dodsley, 1755. 162 pp.

5. *An essay on the causes and cure of the usual diseases in voyages to the West Indies: together with the preservatives against them.* By Solomon de Monchy, City Physician at Rotterdam. Translated from *The Dutch Philosophical Transactions.* London, T. Becket and P. A. De Hondt, 1762. 175 pp.

6. *An account of a useful discovery to distill double the quantity of sea-water, by blowing showers of air up through the distilling liquor, etc.* By Stephen Hales, D.D., F.R.S. With an appendix and plate. London, Richard Manby, 1756. 72 pp.

7. *Directions for impregnating water with fixed air, etc.* By Joseph Priestley, LL.D., F.R.S. London, J. Johnson, 1772. 22 pp. with plate and list of books by the author.

This volume has the curious addition of two pasted-in plates that clearly do not belong to it; as a frontispiece there is a portrait of an unidentified "Lord Edward," published by H. Rowe, Warwick Sqr." Later on there is a beautiful folded plate of the "Organs of Sense See System of Anatomy," "Published as the Act directs by C. Cooke No. 17 Paternoster Row Octr. 30th, 1789."

Mr. Hadley has kindly presented this volume to the library of the University of Edinburgh.

Jacob Helm's Observations and Experiments on Human Digestion

A One Hundred and Fiftieth Anniversary

BRUNO KISCH*

Introduction

SOME time ago I found four volumes of Johannes Müller's well-known textbook of Human Physiology at a second-hand book-dealer's in New York. The first two volumes represented the fourth edition of the first volume, dated 1844, and the third and fourth volume represented the first edition of the second volume (of 1840). The voluminous character of the book, usually published in only two volumes, attracted my attention. The bulkiness of the work proved to be due to the fact that it was entirely interleaved with blank pages. All four volumes are equally bound in cloth with gold printing characteristic of the middle of the last century. The first owner apparently had the original books interleaved so he could make annotations, which he did readily, and had it bound after 1844. His name, printed in the book, was Ernst Brücke (1819-1892), one of the early pupils of Johannes Müller, who upon Müller's suggestion was appointed, while still very young, to the chair of physiology at the University of Königsberg; in 1849 he was called as physiologist to Vienna. One of the inner circle of Müller's pupils, together with DuBois-Reymond, Helmholtz, and others, he was one of the great representatives of physiology in the generation after Johannes Müller.

When I went through Brücke's annotations to the textbook of his teacher, I found one startling remark on page 445 of the first volume, where Johannes Müller reports on the experiments of Beaumont concerning the digestion in the stomach of St. Martin. There Brücke made a note in German which reads: "Similar experiments were already made between 1797 and 1802 by Dr. Helm in Vienna with Theresia Petz of Breitenwaida in Unter-Oesterreich (see Jacob Helm: Two Case Histories, Vienna, at the Camesianische [sic!] Buchhandlung)."

It is known and mentioned even by Beaumont himself that occasional observations about the digestion had been made by previous authors, to mention only Spallanzani, but I did not remem-

* Yeshiva University, New York City.

ber the name of Helm as an outstanding predecessor of Beaumont in this field. An attempt to locate the publication mentioned by Brücke anywhere in the United States was a failure; but I was fortunate enough to secure a photostat of this book from the University Library of Vienna, due to the kind interest of Dr. Hugo Alker, and was astonished at the extensive studies which Helm had carefully and intelligently carried out on a subject similar to that of Beaumont. It seems justifiable therefore to report about his work, his publications, and his personality.

JACOB HELM'S PERSONALITY (1761-1831)

Not too many details are known concerning Jacob Helm's* personality. A few lines in the eighth volume of Callisen's *Medicinisches Schriftsteller Lexicon*[1] indicate that in 1831 Jacob Helm of Vienna, doctor of medicine and surgery, was physician of the *Pensions-Institut für Witwen und Waisen,* a charitable organization for widows and orphans of physicians in Vienna founded in 1758,[2] and that he was superintendent of the *Stumpfe'sche Stiftung für Mediziner,* another charitable institution. He is also mentioned there as a member of the medical faculty in Vienna. In the *Oesterreichisch Kaiserlich Privilegierte Wiener Zeitung,* a Viennese newspaper (2 November 1831, page 1428), mention is made among the obituaries that on October 27th, Dr. Jacob Helm died. It is stated that he died of exhaustion, at seventy-one years of age in Hitzing, one of the outskirts of Vienna; his living quarters are given as house No. 846 in Vienna; it is also stated that he was a member of the medical faculty and the *Witwen Sozietät* in Vienna and a member of the *Gesellschaft der nützlichen Wissenschaften* in Erfurt, Germany. Some other details can be found in the registers of the dean of Vienna's faculty in the University archives. On page 411, the following is mentioned: At a meeting, 9 January 1793, "Jacobus Helm,[3] chirurgiae doctor, promotus 22 Junii 1792," was admitted to the faculty.

* I should like here to express my appreciation and gratitude to Direktionssekretär Dr. Hugo Alker for his helpful collaboration in checking the archives of the University of Vienna for pertinent material.

1 Callisen, A. C. P. *Medicinisches Schriftsteller Lexicon.* Copenhagen, 1831, vol. 8, p. 317.

2 Reitter, Carl. 1899. Urkundliche Beiträge zur Geschichte der Witwen-und Waisen Societät des Wiener med. Doctorencollegiums. In: Ein halbes Jahrtausend. Festschrift anlässlich des 500 jährigen Bestandes der Acta facultatis medicae Vindebonensis. Wien, Verlag Wiener Med. Doctor Collegiums.

3 In the publication of 1801 Helm writes his name Jakob, later on Jacob.

This Jacob Helm (the name is not common in Austria), apparently identical with our author, received the degree of surgical doctor at the age of thirty-one, for that time an advanced age for a candidate to receive this degree. However, in the early nineteenth century not every practising physician in Vienna was necessarily a graduate doctor. It is also peculiar that Helm is mentioned at this place only as "chirurgiae doctor" and not as "medicinae et chirurgiae doctor." However, it also was not necessary for a practitioner in Vienna at the end of the eighteenth century to be a doctor of both medicine and surgery. On page 589 of the same register of the dean of Vienna's faculty is an entry made on 31 January 1799. It mentions the graduation as "medicinae doctores" of five candidates, among them Jacob Helm.

There is some more information, though not too much, concerning Jacob Helm from Constant von Wurzbach's *Biographisches Lexicon des Kaiserthums Oesterreich*.[4] There, in the biography of Helm's son Julius, the father is mentioned as Jacob Anton Helm, born 14 January 1761, died in Vienna 27 October 1831. Wurzbach mentions here that Helm was an esteemed practitioner who rendered meritorious services in the introduction of vaccination in Vienna. Puschmann, in his short History of Medicine in Vienna, mentions Jacob Helm on page 305 as a lecturer in obstetrics at Vienna University in 1805.[5]

This is all I was able to find about the life of Jacob Helm, except for the fact that he was the father of three sons, each of whom was outstanding in his field. The eldest of them, Karl, born on 3 March 1808 in Vienna, studied law and was graduated as a doctor in Vienna, first becoming a teacher, but soon entering government service; he was employed first in the ministry of commerce, then in the ministry of finances. Later on he devoted his life to economics and mainly to governmental charitable institutions, especially those devoted to the care of children in Austria.

Another son, Theodor, born 12 March 1810 in Vienna, was a physician like his father, later on becoming professor at the University of Pavia and eventually medical director of the General Hospital in Vienna. He is remembered in the history of medicine by the fact that he was among the very few who recognized im-

[4] Wurzbach, Constant von. *Biographisches Lexicon des Kaiserthums Oesterreich*, 1862, vol. 8, p. 290.

[5] Puschmann, Th. *Die Medicin in Wien Während der letzten 100 Jahre*. Wien, M. Perles, 1884.

mediately the great importance of the ideas of Semmelweiss when he presented them at a meeting of Vienna's physicians.

The third son, Julius, was born 28 August 1813 in Vienna where he died on 23 December 1844. He, too, was a physician. He was graduated from Vienna University in 1838 and 1839 as a doctor of medicine and of surgery, respectively, but then immediately turned to natural science, specializing in botany and in orchids. Under his care the Botanical Garden of Vienna developed a collection of six thousand orchids growing in Austria, a unique place for the cultivation and exhibition of these interesting flowers.

There is no proof that Jacob Helm later on ever returned to scientific work. A paragraph in the introduction to his book informs us about his modest personality. Mentioning here the experiments of Réaumur, Spallanzani, and Gosse he says:

> If these men had taken care of my patient, they would have done better than I did. I confess my inferiority, and would not like by this paper to elevate myself to the level of these scholars. I merely did not wish to miss this favorable opportunity, and regarded it as my duty to communicate my observations, in order to light a candle in a field where unpenetrable darkness prevails and to replace hypothesis by irrefutable facts in medicine. To clear the path which leads to the truth, to turn isolated observations through experiments and investigations to real experience by analogy and induction, that is the cumbersome but beautiful task of the practitioner among the physicians.
>
> Sublime speculations at the desk will not advance a practical science like medicine the slightest amount, even in centuries, and thousands will pay for them with their lives.
>
> If my laborious experiments should contribute in the least degree to enlightening us concerning one dark problem in animal economy, should they help even one single human being to alleviate his suffering through selection of food which is easy to digest, should they perhaps inspire only physiologists and chemists to a more adequate investigation of the process of digestion, so important for the animal organism, then I feel a hundred times rewarded for every trouble and every expense and I shall be happy to the very end of my days knowing that I have contributed my share to the welfare of mankind.
>
> It is certain that natural science and chemistry have advanced practical medicine and will advance it more than millions of concepts contrived and concocted at the desk.

These quotations are proof of an idealistic personality and a scientist of outstanding qualities, and guided by principles not at all common in the early development of modern medicine. Vienna and Austria can be proud of this physician who earned life's highest award in having educated three fine sons, each of them worthy of their eminent father.

HELM'S PRELIMINARY PUBLICATION OF 1801

In view of the fact that Helm's observations and experiments were entirely forgotten for a century and a half, their first popular as well as their final scientific publication may be of interest. A preliminary report concerning the case of a farmer's wife, Theresia Petz was published in Vienna in a periodical called *Gesundheits-taschenbuch für das Jahr 1801*,[6] which was edited anonymously by a "group of Viennese physicians." This almanac of sorts, meant for laymen, was probably little known among physicians as it is not even mentioned in Callisen's *Lexicon*.[1]

Helm presented a five-page article under the title: "History of an otherwise healthy person with a hole in the stomach, which can be seen from the outside." He signs the article as Doktor Jakob Helm, practising physician at Vienna. In the first sentence of the paper he apologizes for its publication in such a periodical: "A case history in a Taschenbuch! Pfui! It really does not belong in this place! That is what many of our readers will think and say." After making his excuses and explaining how important the stomach is for the happiness and health of people and how important this case history will be for the entire problem of how to choose the best kind of food and how to prevent all that interferes with normal digestion he briefly describes the case history and some of his experiments on a patient with a stomach fistula persisting after an abscess of the abdominal wall had burst.

In this preliminary report[6] a few points are made which are easily lost in the vast amount of material Helm published two years later in his book for the medical world. They may be briefly summarized:

1. The perforation of the abscess had happened in 1797. The patient was then taken to Vienna General Hospital in 1798. An apparatus applied by one of the doctors to keep the fistula closed was not tolerated by the patient. In November 1800, Helm brought her for a time again to Vienna because, as he says, he wanted to watch her more closely and show her to some of his colleagues who refused to believe the entire story. In Vienna she was seen by many persons and, as he says, was presented "in all public medical lectures before the young physicians and surgeons."

[6] Helm, Jacob. Geschichte einer übrigens gesunden Person mit einem von aussen sichtbaren Loche im Magen. *Gesundheitstaschenbuch für das Jahr 1801*. Wien, 1801, pp. 241-245.

2. When a finger was put into the stomach through the hole in the abdominal wall the abdominal aorta could be palpated. This irritation of the stomach wall produced neither pain nor nausea.

3. Helm then performed repeated careful experiments on the milk-coagulating power of stomach juice, as he had already done previously on this patient. He found that milk brought into the stomach coagulated immediately, except when the patient had washed the stomach well by drinking water, and he attributed the fact that the milk in such a case did not coagulate quickly to the lack of stomach juice (*succus gastricus*). His conclusion is based on the fact that some time after the stomach was "washed," when stomach juice had again accumulated, the coagulation of milk took place immediately. Here he made the remarkable observation that the time which had to pass after washing the stomach up to the moment when the milk again coagulated quickly could always be shortened by stimulating the inner surface of the stomach with his finger. This was the first time that attention was called to stimulation of the secretion of stomach juice by mechanical irritation.

His extensive experiments also proved that the coagulation time of different kinds of milk was different. The coagulation of human milk happened most quickly, that of donkey's milk most slowly. Finally he made the observation that, among different kinds of food, meat is most quickly digested in the stomach, and so are cheese and eggs. The digestion of vegetables went on very slowly. Carrots and fruit were sometimes not digested even after six hours in the stomach.

J. Frank (probably the famous Viennese clinician, 1745-1821) adds an editorial remark to this report in the *Taschenbuch* that, instructive as these investigations of Helm may be, they do not offer any decision on the normal behavior of the stomach because they were performed on a sick person.

It cannot be supposed that this first publication of Helm was generally known and evaluated according to its merit except by Vienna's physicians, otherwise Johannes Müller with his comprehensive knowledge surely would have been cognizant of these important physiological facts and would have mentioned them in his textbook on physiology a few decades later.

An extensive publication of Helm's research, already announced in the paper of 1801, was postponed despite the fact that he kept the patient continually under observation because he expected her to die soon and wanted to add the post-mortem findings to his

planned scientific report. In the meantime he tried to find out whether Frank's remark that his observations were not necessarily valid for a normal stomach were justified. This was the reason for a large series of experiments which he heroically performed on himself and on a person whom he had hired for this purpose. Later on, in the introduction to his main publication, he came to the conclusion that the stomach of his patient, though abnormal in form and position, should be regarded as normal in function.

Zwey

Kranken-Geschichten.

Die *erste* betrifft ein Weib mit einem Loche in dem Magen, nebst Untersuchung der Verdaulichkeit der Nahrungsmittel, und einiger Arzeneyen.

Die *zweyte* enthält eine durch die Brust in den Magen gedrungene und glücklich geheilte Stichwunde.

Herausgegeben
von
Jacob Helm,
practischem Arzte zu Wien.

Mit einem Kupfer.

Wien,
in der Camesinaischen Buchhandlung.
1803.

The Book of 1803

Helm's book of 1803 was published by the Viennese publishing house, Camesinaische Buchhandlung, later on known under the name of Heubner's Buchhandlung. The motto of the book is taken from Spinoza—indicating that the explanations of nature are mainly the imaginings of the one who explains.[7] The book is dedicated to the late Count Erwein Eugen Schönborn in deep gratitude. An

[7] "Videmus enim omnes rationes, quibus, natura explicare [sic] solet, modos esse tantummodo imaginandi, nec nullius rei naturam, sed tantum imaginationis constitutionem indicare. Spinoza opera omnia pag. 33."

introduction of sixteen pages follows in which Helm explains the reason why he hesitated to write this extensive case history and refers to the previous publication of 1801. In this introduction Helm carefully summarizes previous reports on patients with a stomach fistula and the earlier work on digestion, mentioning especially Réaumur, Spallanzani, and Gosse, and emphasizing the one point which these scholars were not able to claim, namely, that he had studied details of the digestion within the stomach. In contradistinction to the romantic *Naturphilosophie* blooming at that time in Germany, he refuses to accept theories on the problems involved, instead of facts. Such an attitude explains his choice of the Spinozian motto. Helm regards even the finest speculation at the desk entirely unfit to advance medicine, a practical science which ought to be based on experience only.

The introduction is followed by forty-five pages of details about the experiments he made on himself, on a hired human guinea pig, Ziriak Siebeler, and on the patient. The general results will be mentioned in the following section. Added to the history of the patient are the post-mortem findings which will likewise be mentioned later.

To the book is added an appendix of twenty pages containing another case history of a patient Helm had attended in the meantime. It deals with a twenty-year-old male who was wounded with a kitchen knife, the wound penetrating the stomach. A detailed history of the clinical findings is given, and the follow-up of the patient revealed complete recovery.

Facing the front page of the book of 1803 is an etching presenting the torso of the patient, Theresia Petz, by an unknown artist in the classic style, but generally reminiscent, as our picture shows, of Beaumont's corresponding illustration of Alexis St. Martin's fistula.

Helm's book was by no means entirely neglected by the scientific world in his time. The fact that he had already presented his patient at the University in public lectures must have attracted the interest of the Viennese medical world. The book itself was reviewed in the contemporary literature. In the *Allgemeine Medizinische Annalen* an abstract of it was published in June 1803 (pp. 423-429), another review was printed in the *Medizinisch-Chirurgische Zeitung* in 1804 (suppl. vol. 7, no. 173, p. 16).

Callisen mentions this book as having sold for 8 Groschen and includes a few biographical remarks about the author.

Ernst Brücke knew this book when he made his remark about it in his own copy of Johannes Müller's Physiology, as mentioned above. From 1849 on Brücke was professor in Vienna where probably his attention was called to this remarkable piece of physiological literature. He mentioned Helm's contributions repeatedly in the different editions of his *Vorlesungen über Physiologie* which was in the hands of every student of medicine in Vienna, at least during the time Brücke was teaching there. Later on, apparently, Helm's book and its contents were entirely forgotten.

I have been unable to find in the literature account of Helm's reaction to Beaumont's successive publications despite the fact that he lived until 1831.

Case History and Special Experiments

The patient on which Jacob Helm made his investigations[6,8] was Theresia Petz from Breitenwaida, a small place near Vienna. She was fifty-eight years of age and the mother of seven children. Her parents both reached an age of over seventy. Mrs. Petz had smallpox as a child, otherwise had always been healthy and had been married when she was thirty-three years of age. Her husband was a blacksmith and Theresia not only did all the work in the house and farming as well, but she also helped her husband in his profession. She was able to do all this without complaints and her seven deliveries were normal. Between 1782 and 1796 she repeatedly had colic-like pains in the abdomen, vomiting ensued and a reddish spot appeared in the region of the stomach, similar to an erysipelas, causing an intensive burning and stitching pain. These attacks were repeated every three or four weeks and were less intense during pregnancy. In 1787 she felt a very strong pain whenever she bent down, which Helm describes in the patient's words "as if a dog were gnawing at her stomach." This was regarded by the physicians as stomach cramps, and different remedies were more or less helpful. A vesicatory plaster (Blasenpflaster) put on the stomach region had an excellent effect, which lasted a full year. Mrs. Petz nursed all her children, but none of them reached an age of more than two years; most of them died at a few months of age. Her last pregnancy occurred in 1790, and during this pregnancy she noticed a little tumor in the stomach region which was very painful if touched. After this delivery the condition was unchanged. The pain in the stomach region was very severe; however, the

[8] Helm, Jacob. *Zwey Krankengeschichten.* Wien, Camesinaische Buchhandlung, 1803.

appetite of the patient was always good, even though she was able to eat only small amounts at a time in order not to make her pains unbearable. The tumor increased in size, and in 1796 already reached the umbilicus. The physicians now regarded this disease as an "induration of the spleen," but all the treatments suggested were of no avail. In 1796 the patient became very weak and dropsy developed. Everyone expected her to die soon, but in April 1797 the tumor burst and emptied about a pound of yellowish liquid material. The patient now improved quickly, the tumor was decreasing continuously, the pains disappeared, and the dropsy was no longer present after two weeks. The opening in the wall of the abdomen was the size of a pea and through it was emptied part of the eaten food. At that time Dr. Helm was called to see the patient and took the above-mentioned case history. He found a weak and emaciated person. He prescribed a readily digestible food and repeated cleaning of the abdominal opening and keeping it closed with a plaster. This little opening increased in size during the following months and in July 1797 was big enough to allow entrance of a finger. At that time, a prolapsus of the wall of the stomach through this opening was noticed. For five years Dr. Helm had occasion to observe this patient and to make his experiments, among which was his first interesting observations that the introducing of a catheter into the stomach up to the pylorus or the cardia did not produce any pain, nausea, or vomiting.

Helm's protocols differentiate between observations of the patient and her symptoms which he puts in good order in sixteen different categories, and the experiments concerning the digestion which he made with the patient, performing parallel experiments on himself and Ziriak Siebeler, whom he hired for the purpose. The following are his main observations:

1. The skin of the patient was dry and brittle. She apparently was sweating very little except at the time of her painful attacks.

2. The patient did all her work in the house in good spirits and ate the usual food, like potatoes, starchy food, sauerkraut, and occasionally meat. She drank milk and water and rarely wine which latter produced pain.

3. Two or three hours after each meal she had pains in the back, especially on the left side, became restless, took off her bandage and permitted some food to leave the fistula. During this time she felt a burning pain at the fistula, and acquired the habit of drinking milk and water to "rinse the stomach," as she said.

Afterwards she applied the bandage again but had to eat something immediately. Sometimes she had neither hunger nor thirst; then she could stay without food for 24 to 30 hours and had no pain, but finally the pain returned and she had to eat again. In reference to this point, Helm in a footnote describes clearly that the stomach was divided into two cavities: the lower, the fundus part, normally kept its contents, and only the upper part of the stomach emptied through the fistula.

4. Every kind of food produced pains. The least painful reactions were produced by raw sauerkraut, sour beets, salad, cucumbers, and raw fruit. This food could remain four to five hours in the stomach without producing pains. After this time she had to empty the remains through the fistula, but a great deal of the food was already digested.

5. All food producing gas, like cabbage, turnips, leguminosae, could not be kept in the stomach longer than one hour and was then emptied together with a lot of gas.

6. Within five years the opening of the fistula had not significantly changed and had a diameter of two inches (2 Zoll). Its margin was hard like cartilage, not covered by epidermis, and therefore very painful if touched.

7. In time of bad weather the patient suffered great pain, whether she had eaten or not, and the prolapse of the stomach was bigger.

8. If she was shaken by riding in a carriage or by moving herself much, bile came into the stomach and emptied through the fistula, if the bandage was removed. It had a greenish colour, tasted very bitter, did not mix with the stomach juice, and, if added to milk, made the milk coagulate immediately.

9. In April 1800 the patient again developed dropsy, which disappeared apparently without interference of a doctor within four weeks. After this time she was able to continue with her usual farmwork. In the month of October she even came to Vienna to be demonstrated before physicians and scientists, who otherwise did not believe Helm's report on this case[6] and denied knowing of any similar case report in the literature.

10. Human milk and milk of cow, goat, and donkey, if brought into the stomach either by mouth or through the fistula, coagulated immediately, but if the stomach was well cleaned with water or another fluid, the coagulation of milk was delayed. In the opinion of Helm this was the case, because at that time there was no stomach

juice present. When the latter was secreted again after a few minutes, milk was quickly coagulated. This procedure took the longest time with donkey's milk. Here Helm makes the remark that the coagulate of human milk was thicker and more viscous, but it was completely digested after three hours like that of any other kind of mammals.

11. In the presence of three professors of the University, among them the famous anatomist and physiologist Prochaska, a thermometer was brought into the fundus of the stomach and the temperature measured. It was found 30 degrees of Réaumur (99.4 degrees F.).

12. If the pharynx of the patient was irritated with a feather she tended to vomit but no fluid was brought up; but at this experiment, part of the stomach and its contents came out via the fistula. Chewing of food produced secretion of saliva.

13. Every second or third day a normal bowel movement was passed. The urine appeared normal.

14. The pulse rate per minute was 80 to 85 at rest. After a meal, the pulse rate went up to 112 to 120 per minute. The peripheral arteries appeared at that time soft to the palpating finger. One hour after the feeding, part of the food had to be emptied through the fistula because of pain.

15. A small amount of tartar emetic (Antimonyl-Kaliumtartrat), dissolved in water was brought into the fundus of the stomach. After five minutes the patient felt uneasy and had a burning pain. The undulating movements of the stomach could be observed through the abdominal wall of the emaciated patient and to relieve her pain the stomach had to be washed repeatedly with milk and water; in addition, the patient drank a large amount of these fluids at the same time. A half hour later she rested quietly. Three hours after this experiment she had four watery bowel movements.

16. After all these observations Helm made the remarkable, and probably the first, experiment in the history of medicine: he fed the patient through the stomach fistula exclusively. Every four hours he brought small amounts of different kinds of food into the fundus of the stomach. The patient was neither thirsty nor hungry, but noticed dryness of the mouth, which disappeared when she rinsed her mouth with water. She felt excellent this way for 36 hours, during which time a white foam which was tasteless and odorless appeared at the fistula. Collected in a glass this foam

turned into a watery fluid which did not change the colour of blue plant juice (litmus?). After 46 hours the patient had strong pains. Through the fistula came a viscid, non-odorous, dark-green fluid which tasted very bitter. The patient had to eat again after this in order to feel comfortable but the experiment proved, according to Helm, that the food brought into the stomach was well digested, even without being chewed first. The patient later on repeatedly used this way of feeding herself through the fistula, because it was more comfortable for her.

Helm compared the temperature taken on different places of the patient's body and found, with the Réaumur thermometer, the following degrees:

In the mouth	28 to 30
In the axilla	29 to 29½
In the bend of the knee	27 to 29
In the clenched fist	27 to 29
At the perineum (Mittelfleisch)	26 to 27
In the fundus of the stomach	30

Very similar figures were found by Helm in his own case and also in Mr. Ziriak Siebeler. To compare their own stomach temperatures Helm and Siebeler had a large breakfast and after half an hour provoked vomiting and measured the temperature of the vomited mass immediately. It had a temperature of 30 degrees Réaumur. Their stomach temperatures were therefore equal to the findings in the patient's stomach.

Finally, Helm made a very clever experiment to find out how big an object could be to pass *in vivo* the pylorus and the transition from the duodenum to the jejunum. He and his co-experimentor swallowed big and hard objects, for instance, big hard grapes, which passed the intestines after 15 to 20 hours. Finally, in an heroic attempt for the sake of research, each of them swallowed a hard plum one inch (1 Zoll) in length and ¾ of an inch in diameter, and this object passed through the intestines after 27 hours. From this experiment Helm drew the conclusion that the aperture of the stomach in healthy living presons must be wider than it appears after death.

There followed a series of experiments in which different kinds of food or drugs were brought into the stomach of the patient through the fistula, either within a small bag of linen or by a tube made out of wood or metal, repeating and extending very systematically Spallanzani's experiments. The food investigated in this

way, and taken out of the stomach after a limited time, was partly of plant origin, partly mushrooms and different kinds of meat, and finally drugs.

Without repeating all the details, the main points of Helm's conclusions may be mentioned here which he himself gives in a kind of summary on page 34 and the following pages of his book.

Helm confirms Spallanzani's experiments that food is better digested the longer it stays in the stomach. From this he concluded that a person should avoid everything that quickens the elimination of food from the stomach. No wild motions of the body should be performed after meals. He even suggests after meals not to sit down bent over your desk, to avoid intense laughter, the blowing of musical instruments, wearing clothes which are tight around the stomach, and not to drink too much during meals. The second conclusion from his experiments is, never to overload the stomach with too much food. He also made the important observation that food brought into the empty stomach in the morning was digested more quickly and to a better degree than if different kinds of food were mixed during the day.

A further observation of Helm is that chewing of food and its mixture with saliva is very helpful for digestion and liquefaction. The better the food is mixed with saliva, the easier it is digested, and to find out the normal amount of secretion of saliva, Helm performed an extremely interesting experiment. He wanted to find out how much saliva is produced during the chewing of different kinds of food. This entirely new approach to the digestive problems led to important results. The experiments were performed in the following way: The different foods were weighed exactly, then chewed and, instead of being swallowed, they were spit into exactly weighed containers. Now, a comparison was made between the weight of the food before and after chewing. The following different kinds of food were used for the experiment: noodle soup, beef, sauerkraut, veal, lamb, salami, and bread. The time used for chewing was exactly measured. Helm was surprised at how much saliva is added to the food during chewing—and he performed in this way truly basic, but entirely neglected (later on) pioneer work in the physiology of digestion. He also made the observation that food which he had chewed and had afterwards brought into the stomach of the patient or that of Mr. Siebeler was only slowly digested. It may be open to discussion whether this

inhibitory effect was not so much due to the specificity of his saliva, as he thinks, but to the disgusting psychological effect on a grown-up person of putting into his stomach food chewed by somebody else. So Helm's observations may have been right and unknowingly be the proof of the inhibiting effect of disagreeable sensations on the digestion. He finally leaves it open whether or not it could be decided generally how much fluid is the best amount to be drunk during a meal. He also leaves open the question whether wine has a good or disagreeable effect on the digestion and, relative to this point, gives different quotations from classical authors, like Ovid, Horace, the Apostle Paulus, Plato, and others. Finally, he concludes, from his own experimental experiences, that persons with a weak constitution should lie in bed for one hour after meals to improve the digestion by rest of the body as well as of the mind, and by increasing in this way the body temperature. Helm could not prove that coffee and spices increase the digestion of food. Rather they inhibit the digestion; however, he agrees that personal habit may be a factor in such experiments and he agrees that vinegar and kitchen salt have the most excellent influence among all the spices and similar compounds. The following details may still be quoted from some of his experiments: meat of mammals is, like the meat of birds, fish, and amphibias, quickly digested in the stomach whether it be first chewed or brought into the stomach unchewed, but still better digested if first chewed. Beef is less quickly digested than veal, lamb, and pork. Mutton and wild boar are less well digested than deer and hare. It is also noteworthy that Helm finds that in birds the liver, the heart, and the kidney are less digestible than the meat, and so were salami, smoked tongue, and black-pudding. Easily digested were ham and, in contradiction to other author's experiments (Gosse), boiled eggs and cheese. Entirely undigested in the stomach were crust of bacon, cartilage, tendon and bones; also fishbones.

The following were his experiments with plants and plant products: white bread, noodles, and similar kinds of starchy food were entirely digested within eight or ten hours in the stomach. Dark bread was less quickly and less well digested. Cooked cereal, rice, tapioca, millet-gruel, cooked in soup or milk, were completely digested in the stomach of the patient within three hours. Peas and lentils, if mashed, were better digested than beans. Pears and pineapple were digested more readily than apples. The peels of apples were not digested at all in the stomach; peaches, apricots, plums,

figs, and melons were well digested, even if they were not chewed. If dried prunes were brought into the stomach, they increased in weight during four hours and looked like cooked prunes. This was the case in the patient as well as in both healthy persons. It was similar with raisins, and that led Dr. Helm to the conclusion that children should not be given too much of this kind of fruit and should be told to chew it well. A small cucumber remained in the stomach fairly undigested, even after ten hours, retained the green colour, but after 24 hours had passed the stomach. Chestnuts, walnuts, and almonds, even if peeled, remained unchanged in the stomach; they were a little bit digested if chewed first. Well digested in the stomach were red and white turnips, potatoes, and celery. Unchanged during 24 hours, was a piece of horseradish in the stomach of the patient, whether raw or well cooked; onions were quickly digested, lettuce was better digested if prepared with vinegar and oil than if introduced without vinegar. Most easily digested among all vegetables was asparagus; mushrooms if not well chewed were very little digested.

These were the experimental experiences which Dr. Helm made on the patient, on himself and on Mr. Ziriak Siebeler during five years.

The patient finally died in October 1802 after a few days of colicky pains and continual thirst which lasted two days and nights. An autopsy was performed; there was an inflammation of the intestines and the mesentery; the stomach with its anterior part was at the margin of the fistula coalesced with the peritoneum, but was otherwise freely movable and in its normal position. The pylorus and the cardia, the big and small curvature, and the dorsal wall of the stomach were normal. Between the spleen and the fundus of the stomach there was a "pseudo-abscess," containing a few ounces of yellow fluid. Similar fluid was in the pelvic cavity; the other intestines were normal, the lungs were at different places grown together with the pleura. The stomach preparation was transfered to the museum of Professor Frank.

These are the main contents of Jacob Helm's book. They prove that this physician had performed very extensive, skilled, and successful investigations on the human digestion in the stomach and on saliva and bile. In spite of the fact that his work had no immediate effect on physiology, he seems to be the most important predecessor of Beaumont in the field of human chymology.

Helm's Findings Compared With Previous Investigations

It is evident from Helm's introduction to the book[8] that he was careful to look up all previous authors who experimented with digestive juices. There are mentioned only experiments of three authors besides those who had observed only patients with fistulas of the stomach without experimentation. There are the well-known experiments of Réaumur (1683-1757) in France who had made investigations on the influence of stomach juice of birds, especially on the digestion of meat. He also mentions the well-known experiments of the Italian, Lazaro Spallanzani (1729-1799), who studied the action of saliva on food stuffs and continued with the investigation of Réaumur on gastric juice. Helm likewise mentions the experiments of Gosse, but unfortunately he does not give the exact source where these experiments can be found and up to now I have been unable to find out which of the different medical authors from the eighteenth and early nineteenth century by the name of Gosse had worked on the function of intestinal juices. He also mentioned Circaud's patient Gauret, who had a stomach fistula and died before thorough experiments could be performed. This patient's history was first reported by Circaud (*J. de Physique et Chymie et d'histoire naturelle* An 9 [1801]) and later on by Corvisart and Leroux (*J. de Médecine, Chir. Pharm., Paris,* An 10 [1802]).[9]

There can not be any question that in certain spheres Helm's investigations represent remarkable progress, even compared with those of Spallanzani. A few points only should be mentioned which show the advance of Helm's modern investigations over Spallanzani's previous fundamental work. First, Helm approached his problems from the viewpoint of practical medicine. He wanted to find out, as he emphasized, new hints as to the best way to feed healthy and sick people. He therefore tried to study the fate of food not only *in vitro* if stomach juice was added, which he also did, but his main intention was to follow up the fate of the ingested food within the stomach itself in regard to the time elapsed after the food was brought into the stomach. For this purpose he had the patient empty the stomach from time to time through the fistula or, after a certain time he pulled the food out of the stomach or the little containers of food which he had made using Spallanzani's method by an attached string. This method was an advance over

[9] Thorek, Max and Thorek, Philip. Historical notes on perforation, ulcer of the stomach and gastric fistula. Pp. 383-395 in *Victor Robinson Memorial Volume.* New York, Froben Press, 1948.

Spallanzani as the food did not pass through the entire intestines, but was exposed really only to the influence of gastric juice. It is also practical medicine that Helm, by the interesting method of swallowing big objects which are not easily digested, tried to find out how big the opening of the pylorus is in living persons. Not less important from the medical viewpoint is his measuring the temperature in the stomach of the patient and of two normal persons, where again his method is a good scientific approach to the problem.

Finally, it was of utmost importance for practical medicine that Helm proved for the first time the possibility of feeding a patient for a longer time through the fistula exclusively.

Worth mentioning from the physiological viewpoint is Helm's discovery of the regurgitation of bile into the stomach and his quantitative observations on how much saliva is produced by chewing the food when different kinds of food are used and also his discovery that mechanical irritation of the wall of the stomach precipitates the production of gastric juice.

All the details of Helm's work are by no means exhausted by enumerating these points in which his investigations were superior to those of his predecessors. It is not intended to go into further detail. A thorough investigation of his work in chymology may be worthy of special study.

The Contribution of Neurology to the Scepticism of Alfred de Vigny

IRVING MASSEY*

I. The Background of Vigny's Neurological Knowledge

ALFRED de Vigny is known to the majority of his American readers by a handful of poems, such as "Moïse," "La Mort du Loup," or "Le Mont des Oliviers," most of them characterized by the two salient features of stoicism and doubt.[1] The bulk of Vigny's remaining poetry, some of it in a very different vein, as well as the interesting philosophical tales of *Stello, Daphné,* and *Servitude et Grandeur Militaires,*[2] remain comparatively unknown to the English-speaking public. Yet within these relatively unfamiliar bodies of writing is to be found an elaborate complex of thought underlying the apparently simple ideas of Vigny's few famous verses, a labor of intellectual integrity which supports the poetry's continuing appeal.

The two attitudes of stoicism and scepticism with which Vigny's writing has been proverbially associated are themselves no naif expressions of petulant discontent, but the by-product of a lifetime's training in the renunciation of personal hopes and intellectual certainties. These opinions are founded on both experience and comprehensive study. Classical philosophers made their contribution to Vigny's thinking, but his scientific contemporaries also shared in his intellectual growth. Much of Vigny cannot be adequately understood without an awareness of the relation of his ideas to certain scientific concepts of his day.

Let us take the relation of stoicism to scepticism in our author as an example. Stoicism and scepticism in their Alexandrian expression would seem to be antithetical doctrines; but in Vigny the two exist side by side. ". . . je suis stoïcien,"[3] we hear, but then, "nul n'enseigne, puisque nul ne sait."[4] At other times one attitude

* Cambridge, Massachusetts.

1 I should like to thank Dr. W. W. Francis and Miss Cécile Desbarats of the Osler Library, McGill University, Professor Howard Hugo of Harvard University, and Dr. Henry R. Viets of the Boston Medical Library, for assistance in the preparation of this paper.

2 Recently translated by H. Hare as *The military necessity.* New York, Grove Press, 1953.

3 Vigny, Alfred de, *Oeuvres complètes* (Paris, Bibliothèque de la Pléiade, 1948–), vol. 2, p. 1113.

4 *Ibid.,* p. 773.

shades into the other. "Comment désire-t-on quelque chose après trente ans? Quelquefois je ne le conçois pas. Un état de vie ne vaut pas mieux que l'autre."[5] This is a sceptical observation with a superficial resemblance to stoicism. It does agree with the stoical opinion that all conditions are equally unworthy of being preferred one to another, but it also implies that life is composed of ordinary situations capable of description in terms to which value-judgments do not apply.[6]

To understand this affiliation of the stoical with the relativistic an awareness of Vigny's interest in psychiatry is essential.[7] Psychiatry demands psychological objectivity, and the kind of neutral description upon which it relies leads easily to relativism. On the other hand, the need for psychiatry is also a natural consequence of the Stoic point of view.[8] Two seemingly unrelated doctrines thus converge in a scientific procedure.

It is not often recognized that the scientific background of his period, a background permeated with psychological materialism, had any influence on Vigny's ideas. Yet Vigny's understanding of mental phenomena is based upon Condillac and the Idéologues, whose neurological interests and sensationalist bent determined the orientation of French psychology for the best part of the nineteenth century. We shall remember Condillac's observation, "Penser est sentir,"[9] when we find Vigny uneasy about accepting "absolute" ideals because he is too well aware of the rôle of the emotions in determining opinions.[10] In Vigny's novel *Stello* we discover an attack on the doctrine of final causes and a defense of analytic method in philosophy[11] identical not only in spirit but in its very

5 *Ibid.*, p. 1000.

6 Such description is important in the therapy of Stello (the hero of the novel of that name), who must be cured of his malady of excessive idealism. See below, note 96.

7 Bonnefoy, Georges. *La pensée religieuse et morale d'Alfred de Vigny* (Paris, Hachette, 1944, xxiii + 462 pp.), p. 143. "Vigny a fréquenté les cliniques des docteurs et des psychiâtres de l'époque; on lui connaîtra toujours ce goût et on s'accorde à voir, dans le Docteur Noir, l'antiphrase du célèbre Docteur Blanche."

8 Chrysippus insisted that doctors of the mind were just as necessary as doctors of the body. See H. von Arnim, Stoicorum veterum fragmenta (Leipzig, Teubner, 1903, 3 vols.), vol. 3, fragment 120, line 15. For the Stoics, who considered all but the wise insane, philosophy itself was a form of psychiatry. See Epictetus, *The discourses* (London, William Heinemann; New York, G. P. Putnam's Sons, 1926-28, 2 vols.), vol. 2, p. 181. See also below, note. 101.

9 Condillac as quoted in Bernard Hollander's *In search of the soul* (London, Kegan Paul; New York, E. P. Dutton & Co., 1921, 2 vols.), vol. 1, p. 160. See Vigny (note 3), vol. 2, p. 1232, for a direct reference to Condillac.

10 Bonnefoy (note 7), p. 50. See below, note 85.

11 Vigny (note 3), vol. 1, p. 753. In a reference to Cousin (*ibid.*, vol. 2, pp. 996-997), Vigny notes every point where the philosopher seems to prefer analysis to synthesis, but omits his final word, proposing the rehabilitation of synthesis. See Victor Cousin, *Cours de l'histoire de la philosophie* (Paris, Didier, 1841, 2 vols.), vol. 1, p. 115.

phraseology with the opinions of Condillac's followers, the Idéologues.[12] It is apparent that (despite his expressed hostility to the "philosophes"[13]) Vigny, like Balzac, Stendhal, and many other French authors of the early nineteenth century[14] was heavily influenced by the empirical tradition deriving from Locke through Condillac, the Encyclopedists, Cabanis, and de Tracy.

The emphasis on analysis in philosophical method is one sign of Vigny's affinity with the Idéologues and their psycho-physiological approach. Another indication of this kinship is Vigny's interpretation of criminal behavior as the result of defects in the criminal's neurological organization. The French Revolution fostered a new and sympathetic understanding of insanity; the law of 30 June 1838, giving mental patients a legal right to the same treatment as other invalids,[15] was a belated result of the humanitarian approach adopted by Pinel at the Bicêtre. But there were further effects of the sudden recognition of the rights of the mentally ill that emerged from the Revolution. The physiological arguments by which the criminally insane can be exonerated may be extended to normal people, so that eventually the very notion of moral responsibility becomes meaningless. Not only an ethical, but even a legal problem[16] arises if morality is resolved into the displacement of one neurophysiological pattern by another.

Actually, as early as 1748, La Mettrie in *L'Homme machine* had understood the criminal to be an invalid.[17] But systematic support for such assumptions was lacking until studies of the nervous system by the psycho-physiologists about the turn of the century undertook to show that the criminal could not control the propensities which his brain imposed upon him. Both the humanitarian and the neurological arguments linking social misconduct with mental illness were eventually reflected in the work of Vigny.[18]

The neurologist Franz Joseph Gall, whose name appears briefly but significantly in *Stello*,[19] maintained that crime is a disease, a

12 For the Idéologues' insistence on analysis and antagonism to "final causes," see Pierre Jean Georges Cabanis, *Rapports du physique et du moral de l'homme* (Paris, Hector Bossange et Cie, 1802, 2 vols.), vol. 1, pp. 164-165.

13 Vigny (note 3), vol. 1, p. 640.

14 Cailliet, Émile. *La tradition littéraire des idéologues* (Philadelphia, American Philosophical Society, 1943, xxi + 322 pp.), pp. 136-153.

15 American Psychiatric Association. *One hundred years of American psychiatry* (New York, Columbia University Press, 1944, xxiv + 649 pp.), p. 32.

16 See Raymond de Saussure, The influence of the concept of monomania on French medico-legal psychiatry (from 1825 to 1840). *J. Hist. Med.*, 1946, *1*, 365-397 (pp. 367, 389).

17 La Mettrie, Julien Offray de. *L'homme machine* (Paris, Bossard, 1921, 215 pp.), pp. 100-101.

18 See below, note 27.

19 See below, note 62.

medical problem, and the criminal a victim of his neurological organization. We can still respect many of Gall's insights into criminal psychology. For instance, he believed that people could not be held fully responsible for misbehavior under the influence of unusual physical conditions, such as pregnancy, or under the pressure of emotional tensions of any kind;[20] and neither difficult physical conditions nor extreme emotional tensions are rarities in human experience. On the other hand, where crime is actually the consequence of a defective disposition, we must simply accept that fact. The twentieth century has acknowledged that anti-social impulses are a major force in man and cannot be preached away. Gall was anticipating this acceptance when he declared that there was an undeniable satisfaction in carrying out such impulses and that they are not necessarily followed by regret.[21]

Vigny's friend, Dr. Brierre de Boismont,[22] was also involved in the criminological discussions of the period. In Boismont's view, the mental invalid simply cannot be held accountable for his actions; and mental illness is surprisingly widespread. It is ridiculous to take revenge upon an "invalide moral." Boismont's opposition to capital punishment was based on his observation, as a psychiatrist, that misbehavior is largely involuntary; as he understood it, a result of the influence of the body on the mind.[23]

What bearing has the issue of criminal responsibility on the work of Vigny? There are a number of statements in *Stello* which reveal an affinity for the radical opinions we have described. Let us compare a few lines from Dr. Boissier's study of La Mettrie with a paragraph from Vigny's novel *Stello.*

> Que "le sage plaigne les vicieux sans les haïr, car ce sont que des hommes contrefaits," que les crimes ne soient que des réponses à des troubles de l'organisme, et non des volontés librement consenties . . . que les crimes soient commis "par tempérament," que les vertus et les vices soient héréditaires . . . que la faim, la grossesse ou la continence soient de mauvaises conseillères, génératrices de mouvements irrésistibles, et voilà posé dans son entier le problème de la responsabilité pénale.[24]

[20] Gall, F. J. et Spurzheim, G. *Des dispositions innées de l'âme et de l'esprit* (Paris, F. Schoell, 1811, 397 pp.), pp. 393-395.

[21] Gall et Spurzheim, *op. cit.*, pp. 267-268.

[22] For Vigny's relationship with Boismont see the *Correspondance d'Alfred de Vigny* (Paris, Renaissance du livre, 1913), vol. 1, p. 127.

[23] Boismont as quoted in René Semelaigne's *Les pionniers de la psychiatrie française* (Paris, J. B. Baillière et Fils, 1930-1932, 2 vols.), vol. 1, p. 234. Vigny's criticism of capital punishment reveals his interest in penal theory (*Oeuvres complètes,* vol. 2, p. 1038).

[24] Boissier, Raymond. *La Mettrie* (Paris, Les Belles Lettres, 1931, 182 pp.), p. 150. La Mettrie would have liked to see psychiatrists replace criminal judges. See La Mettrie (note 17), p. 101.

In *Stello* we find the well-known remark, "Les hommes sont partout et toujours de simples et faibles créatures plus ou moins ballottées et contrefaites par leur destinée."[25] Exploring the psychology of those supposed demons, men or quasi-men, the members of the "comité de salut public," Vigny has Doctor Noir say:

> dans ces coeurs troubles vous verrez . . . des sentiments immondes, nés . . . de la faiblesse de leur organisation incomplète,[26] plus que d'une aveugle perversité. . . . C'est une doctrine qui m'est particulière, monsieur, qu'il n'y a ni héros ni monstre. . . . votre coeur vous inspire, pour ceux que les hommes qualifient de *monstres,* une profonde pitié, et ma tête me donne pour eux un profond mépris. . . . Car, s'il n'y a de monstres qu'aux cabinets anatomiques, toujours y a-t-il de si misérables créatures, tellement livrées, et si brutalement, à des instincts obscurs et bas . . . que je ne me sens ni rire ni larmes pour eux, mais seulement le dégoût qu'inspire le spectacle d'une nature manquée.[27]

Here a typical ambiguity in Vigny emerges. On the one hand, Vigny's conviction that all men are equal springs from his idealistic faith in the worth of all mankind (Stello's view, as well as the view achieved in "La Flûte") ; on the other hand, it is contaminated by a neutralizing relativism, a psychological materialism which agrees that no man should be blamed more than another only because it assumes that no man is anything more than a parcel of matter. The bold front of idealism blurs into the mask of doubt. "Vous êtes surpris de me voir ici de votre avis,"[28] says Doctor Noir to Stello. The man who had to reconcile two such different implications under the same conclusion was condemned to permanent inner discord.

But Vigny's concern with criminal psychology does not tell the whole tale of his involvement with the psycho-physiologists. Even so exclusively materialistic an approach as that of Georges Cabanis held some appeal for him. Cabanis attempted a synthesis of Condillac's sensory emphasis with objective physiology,[29] and sought to

25 Vigny (note 3), vol. 1, p. 695.

26 ". . . the phrenological fashion of the day interpreted crime as a disease, and deplored great criminals as victims of their organisation." (See Owsei Temkin. Gall and the phrenological movement, *Bull. Hist. Med.*, 1947, *21*, 305).

27 Vigny (note 3), vol. 1, p. 691. The latter part of this opinion parallels Gall's conviction that some people are irretrievably brutish. *Des Dispositions innées,* pp. 245-246. (See also above, note 24: La Mettrie's "hommes contrefaits.") There are numerous other instances of Vigny's use of the neurological terminology of his day with reference to crime. (*Oeuvres complètes,* vol. 2, p. 1304, or p. 1312: "Des crimes, Faiblesse ou bêtise d'esprit borné. . . ." On pp. 973-974: "La force vient du cerveau dans l'homme," while "Les crimes viennent de faiblesse.")

28 Vigny (note 3), vol. 1, p. 691.

29 Rosen, George. The philosophy of ideology and the emergence of modern medicine in France. *Bull. Hist. Med.*, 1946, *20*, 331.

establish a solid physical basis for all psychic phenomena.[30] The influence of the "moral" on the "physique" he declared to be nothing but the influence of the brain—the master organ—on the other organs.[31] Thoughts themselves are merely extensions of certain physiological proceedings.[32] The brain is an apparatus for processing impressions, just as the digestive system is an apparatus for processing its food.[33]

In view of the currency of such opinions in this period, it is not surprising to find in the manuscript of *Cinq-Mars* the following statement:

> ce qu'on appelle âme et une pensée est la sécrétion du cerveau, comme le sang est . . . l'aliment des veines; elle cesse avec son enveloppe,[34] mais jusque là produit un amalgame, un être qu'il faut caser le mieux possible selon les goûts que ses organes lui ont donné.[35]

Though these words are attributed to the villainous "Père Joseph," they cannot be dismissed as mere irony, since Joseph has a good deal of Doctor Noir about him;[36] both are spokesmen for reality. Should the affiliation at first seem strained, it becomes quite natural when we find Père Joseph saying, "Il n'y a point de monstre ni d'homme vertueux";[37] it was also he who had ventured, "Il n'y a peut-être ni damnation ni âme."[38] Both Joseph and Doctor Noir are "ingénieux à trouver le côté faible de vos rêves. Il y a un ver qui rampe au coeur de tous ces beaux fruits."[39] Though Vigny read La

[30] Cabanis emphasizes the rôle of the gonads in determining the total behavior of the organism (note 12, vol. 1, p. 309 ff., vol. 2, pp. 364 and 368). Might not Vigny's conviction of the intellectual inferiority of women derive in part from the scientific clichés of his day? Vigny describes the mental processes of "Eva" in "La Maison du berger" (note 3, vol. 1, pp. 179-180) as follows: "Ta pensée a des bonds comme ceux des gazelles,/Mais ne saurait marcher sans guide et sans appui./Le sol meurtrit ses pieds, l'air fatigue ses ailes,/Son oeil se ferme au jour dès que le jour a lui;/Parfois sur les hauts lieux d'un seul élan posée,/ Troublée au bruit des vents, ta mobile pensée/Ne peut seule y veiller sans crainte et sans ennui." Cf. Cabanis' statement (note 12, vol. 1, p. 335) that woman, because of her total bodily organization, "est justement effrayée de ces travaux de l'esprit qui ne peuvent s'exécuter sans des méditations longues et profondes: elle choisit ceux qui demandent . . . plus d'imagination que de raisonnement." P. 336 continues the disparagement of woman's intellect.

[31] Cabanis, *op. cit.*, vol. 2, p. 426. Vigny shared the current emphasis on the brain as the principal feature of the organism. The heart is nothing but "un morceau de chair bleuâtre"; "L'âme ne me semble se servir réellement que du cerveau pour son instrument." (Note 3, vol. 2, pp. 1198-99; see p. 1127 for other similar remarks.)

[32] Tencer, Marie. *La psychophysiologie de Cabanis* (Toulouse, Imprimerie du Sud-Ouest, 1931, 138 pp.), pp. 125-126.

[33] Cabanis, *op. cit.*, vol. 1, pp. 159-160.

[34] Le Mettrie too insists that the soul is inconceivable without the body. See note 17, pp. 15-16. (Quoted from *Traité de l'âme.*)

[35] Bonnefoy (note 7), p. 148.

[36] The proxy for Doctor Noir in *Quitte pour la peur* is Doctor Tronchin. Even *Chatterton* has a doctor (the Quaker).

[37] Vigny (note 3), vol. 2, p. 336. (See above, quotation over note 27, for the equivalent statement by Doctor Noir.)

[38] *Loc. cit.*

[39] *Ibid.*, vol. 2, p. 337.

Rochefoucauld in the critical edition of a hostile editor,[40] such maxims as "La force et la foiblesse de l'esprit sont mal nommées; elles ne sont en effet que la bonne ou la mauvaise disposition des organes du corps,"[41] had obviously not been lost on him.

The most important single figure for our study of the rôle of neurology in Vigny's thought, as well as the most pervasive influence in the medical psychology of the nineteenth century,[42] is the physician whose theories of criminology we have already discussed: Dr. F. J. Gall. Gall's work was often misunderstood or ridiculed. Its full value has only recently been recognized, as the distortion imposed upon it by the "phrenologists"[43] begins to be forgotten. "Phrenology" is merely an epithet with which the great contribution of early nineteenth century neurological inquiry has been ignorantly dismissed. Discarding the Idéologues' introspective psychology, Gall attempted to establish the study of the brain on a purely descriptive and operational basis as a material body with finite properties giving rise to a limited range of behavioral possibilities in people.[44] Modern neurologists, exploring the brain with leucotome and electrode, are less confident in the interpretation of their results than was Doctor Gall.[45] Nevertheless we must grant that Gall's approach, the search for physical counterparts to psychological phenomena, is the road which progress in neurology has taken.

It has been doubted by certain critics that Vigny could have had any serious interest in materialist psychology.

> Il s'occupera de physiologie; mais la physiologie ne mordra point sur son idéalisme; et il n'est jamais à craindre avec lui que la matière détrône l'esprit. . . . L'auteur de *Stello* (1832) rend un hommage plutôt ironique au 'bon docteur' [Gall]. . . . Bref, il reste spiritualiste, religieux. . . .[46]

[40] Verdun Saulnier in Vigny's *Les destinées* (Paris, Droz, 1947, lviii + 238 pp.), p. 138. The editor is Aimé-Martin.

[41] La Rochefoucauld in Louis Aimé-Martin's *Examen critique des réflexions . . . de la Rochefoucauld* (Paris, Lefèvre, 1822, 140 pp.), p. 34. Cf. quotations from Vigny (note 3), vol. 2, in note 27 above.

[42] Spoerl, Howard Davis. *The problem of faculties in the psychology of character during the nineteenth century* (Harvard University thesis, typewritten, 1933, iii + 235 pp.), p. 1.

[43] Spoerl (*op. cit.*, pp. 52-53, p. 33) summarizes the phrenological distortion of Gall's work. See also Temkin (note 26), p. 280.

[44] Temkin (note 26), pp. 290-291, 300-304.

[45] "The number of contemporary brain pathologists who still cherish the idea of a localization of functions is small." See Walther Riese and E. C. Hoff, A history of the doctrine of cerebral localization, second part. *J. Hist. Med.*, 1951, *6*, 464. Another closely reasoned assault on the localizing principle may be found in Jules H. Massermann. Is the hypothalamus a centre of emotion? *Psychosom. Med.*, 1941, *3*, 3-25.

[46] Citoleux, Marc. *Alfred de Vigny: persistances classiques et affinités étrangères* (Paris, Champion, 1924, xvi + 654 pp.), p. 3. Even Bonnefoy (note 7, p. 147), records only that Vigny read a refutation of Gall on p. 58 of A. G. Schlegel's *Leçons sur l'histoire et la théorie des beaux arts* (Paris, Pichon et Didier, 1830, xliv + 404 pp.). Bonnefoy overlooks the defense of Gall in the translator's lengthy footnote.

This summary of Vigny's attitude with regard to physical science gives us an excellent idea of what Vigny would have *liked* to feel. Unfortunately, when we see the poet Gilbert in *Stello* wrangling with the demons of the Encyclopedists and impotent to rid himself of the encroachment of reason on faith,[47] we are forced to recognize another side to the situation. Vigny, indeed, showed a significant interest not only in Gall but even in his predecessor Lavater. We find references to "La Physionomie" at such widely separate dates as 1826 and 1845.[48] Gall himself settled in Paris in 1807 and soon after published his main work, *Anatomie et physiologie du système nerveux*.[49] Cuvier responded favorably to a paper on the nervous system submitted by Gall to the Institute in 1808.[50] Even Gall's opponents shared some of his theories.[51] One of the curious facts of intellectual history is that the enemies and proponents of a doctrine are subsequently often difficult to distinguish from one another because neither has solved the problem they investigated. So Bonald defines the brain as the instrument of the soul, not the soul itself[52]—but Gall, too, retained the old concept of the instrumentality of the brain, though "in a manner which seemed destructive of man's spiritual entity and of his freedom of action."[53] Vigny makes the brain the mirror of a corporeal soul in gaseous form. "Autour de notre cerveau, sous la voûte du crâne, tourne et roule une certaine vapeur. . . . Des savants ont dit que c'était l'âme elle-même. Peut-être est-elle ainsi conformée."[54]

It is amusing to find that Gall and Vigny use the same examples to contrary purposes. Gall cites cranial injuries producing unusual mental vigor as evidence that the irritation of an organ can exaggerate its function.[55] Vigny gives these instances a contrary

47 Vigny (note 3), vol. 1, pp. 639-640; vol. 2, p. 1116: "Nous nous enivrons de croyances mensongères, nous nous exaltons à froid. . . ."

48 *Ibid.*, vol. 2, pp. 95 and 1232.

49 Temkin (note 26), p. 279.

50 Ferraz, M. *Étude sur la philosophie en France au xix^e siècle* (Paris, Didier et Cie., 1877, xxxi + 482 pp.), p. 241. For references to Cuvier in Vigny see *Oeuvres complètes*, vol. 2, pp. 967 and 1218; *Correspondance 1816-1863* (Paris, Calmann-Lévy, 1906, vi + 406 pp.), p. 86.

51 Flourens, who opposed Gall on some issues, was himself a localist. Spoerl (note 42, pp. 18-19), clarifies the issue between Gall and Flourens. For a reference to Flourens in Vigny see *Oeuvres complètes*, vol. 2, p. 1218.

52 Bonald as quoted in Vigny, *Les destinées*, p. 138.

53 Temkin (note 26), p. 283.

54 Vigny (note 3), vol. 2, p. 1318. P. 1319 adds, "Toujours est-il certain qu'elle fait du cerveau un miroir, comme le mercure sous le verre." Analogous remarks occur on pp. 1198-99, and on p. 791: "Sous la boîte osseuse du crâne circule sans cesse, comme un orage invisible, la pauvre âme qui n'en peut sortir qu'avec tant de peines. . . ." This gaseous soul seems quite similar to the physiological processes postulated by van Helmont. See Fielding H. Garrison, History of neurology. In Charles L. Dana's *Textbook of nervous diseases*, New York, William Wood and Co., 1925, p. xxxiii.

55 Gall et Spurzheim (note 20), pp. 53-55.

significance, trying to show that the soul is independent of its physical circumstances and its latent power is always available,[56] though its organ for expression, the brain, may not function properly until re-worked by surgery. Malebranche, who supposedly showed his intelligence only after a head injury, is one of his favorite examples.[57] Vigny also uses such examples to prove the equality of all souls, locked in repositories which are defective to varying degrees. "L'égalité des âmes, elle peut se prouver par l' exemple de Grétry, vulgaire esprit avant d'être trépané, génie supérieur après le coup et le trépan."[58] Gall, on the contrary, held that inherited mental traits establish a permanent inequality among men.[59] But we may be surprised to find him quoting Vigny's favorite Platonist, Malebranche, in support of his own materialist thesis!

> Malebranche a dit aussi avec raison que 'la différence des goûts . . . provient en grande partie de la différence de l'organisation; qu'en général nos penchans et nos facultés dépendent de la même cause, et qu'en conséquence l'on ne peut mieux employer son temps qu'à rechercher les causes matérielles des changemens qui nous arrivent, afin d'apprendre à nous connoître nous-mêmes.'[60]

Gall, even vie Malebranche, offered a lamentably uninspiring interpretation for Vigny's *γνῶθι σεαυτον*.

In his later work Vigny achieves a fairly pure Platonism. Through abandoning the idea of perfection on earth he resolves some of his paradoxes. It is no longer necessary to worry that the conditions of the brain may have some influence on the soul, since in any case the soul is not an autonomous entity during our physical existence. It can never be pure until it is freed from its envelope; in this life it is always more or less hampered. But after death the soul learns that the body, not itself, was at fault:

> Du corps et non de l'âme accusons l'indigence.
> Des organes mauvais servent l'intelligence.[61]

Through this philosophy Vigny was able to transcend, or at least sought to transcend, all arguments based on empirical evidence for or against the physical soul. He was no longer committed

56 See *ibid.*, pp. 127-128, for the precisely opposite view.

57 Vigny (note 3), vol. 2, pp. 1186 and 1199. (Vigny was in error about Malebranche. See Saulnier in Vigny, *Les destinées*, p. 132, note 2). Bonnefoy (note 7 [p. 325]) discounts the importance of Vigny's occasional attempts to "prove" the freedom of the soul. Support for Bonnefoy's doubts may be found in Vigny (note 3), vol. 2, pp. 1359 and 1377.

58 Vigny (note 3), vol. 2, p. 1365.

59 Temkin (note 26), pp. 300-305. See Gall et Spurzheim (note 20), pp. 129, 244.

60 Gall et Spurzheim, *op. cit.*, pp. 57-58. In the matter of varying tastes Malebranche was referring particularly to music.

61 Vigny (note 3), vol. 1, p. 201.

to proving that the soul can exercise its freedom in spite of physical interference, for the realm of the soul's effectiveness is not in the physical world at all.

But at the beginning of the *Première consultation du Docteur-Noir (Stello)*, Vigny, or that part of him represented by the poet Stello, had not yet given up his hope for an ideal in reality. And it is the realist Gall who is chosen for the assault on the physical or realizable ideal. Stello is suffering from an attack of spleen.

> Quelle forme symbolique pourrais-je donner jamais à cette incroyable souffrance? Ah! j'y entrevois quelque possibilité, grâce à un savant. Honneur soit rendu au bon docteur Gall. . . ! Eh bien, mon ami, sachez donc qu'à cette heure . . . tous les Diables de la migraine . . . sont à l'ouvrage sur mon crâne. . . . Il y a un Farfadet, grand comme un moucheron . . . qui tient une scie d'une longueur démesurée . . . il suit une ligne oblique qui va de la protubérance de l'*Idéalité,* no. 19, jusqu'à celle de la *Mélodie,* . . . no. 32. . . . deux Gnomes . . . ont établi un coin de fer tout au beau milieu de la protubérance dite du *Merveilleux*. . . . Tenez, les voilà à présent réunis, amoncelés, accumulés sur la bosse de l'*Espérance.*[62]

Stello had to go through a primary purification to prepare him for a second and more important one; he had to be purged of false ideals before he could be ready for true idealism. We cannot have a heaven on earth, and the refusal to admit this fact is based on an unwillingness to acknowledge the unideal and material components of one's own constitution. With the aid of Doctor Noir and Doctor Gall, Stello (or Vigny) was purified of his aspirations to perfection in this world. Only then might he begin to see the hope for our imperfect lives in a beyond where no defective organs handicap the soul.

Stello is a *Bildungsroman,* the novel of an education. Stello is suffering from the spleen because he knows that he must undergo the painful operation of having all his illusions eradicated. But previously, too, Stello had been aimless and apathetic, because he was confused. Living by the assumption that life harbors the possibility of perfection, he had fallen into apathy because his philosophy bore no relation to experience. Stello's political utopianism is nothing but an expression of his readiness to ignore the nature of the real world and to assume that one can override its requirements at will; a symbol of the misguided search for earthly happiness. Therefore, when Stello shifts from complaints about his subjective melancholy to the apparently irrelevant subject of politics,

[62] Vigny (note 3), vol. 1, pp. 625-627.

his associations are following a natural sequence from malady to cause.[63]

The disincarnate ideal is not yet present to Stello's understanding; on the other hand, he rebels against acknowledging the ascendancy of the physical in this world, in the functions of the brain, in society. For the present, Stello is despondent.

> Hélas! hélas! mon Dieu, pourqui avez-vous permis à ces petits monstres de s'attaquer à cette bosse du *Merveilleux?* C'était la plus grosse sur toute ma tête, et celle qui me fit faire quelques poèmes qui m'élevaient l'âme vers le ciel inconnu, comme aussi toutes mes plus chères et secrètes folies. S'ils la détruisent, que me restera-t-il en ce monde ténébreux?[64]

A purer truth will be Stello's consolation when his "bosse du Merveilleux" and his "bosse de l'Espérance" have been destroyed. The repellent little demons who have reduced his transcendental aspirations to areas on Dr. Gall's materialistic map of the brain are Doctor Noir's assistants. First they define Stello's idealism in material terms, then they set to work to eradicate it. In so doing they render Stello an invaluable service; they help him to make the correct cleavage between the ideal and the real.

The real is everything which is entangled with matter. There is no purity to be expected of reality. The very functions of the mind are material functions, subject to scientific description. The ideal must not be confounded with anything in actual experience. It is disincarnate; it can be reached by the soul alone, and only after death.

> Je crois qu'après la mort, quand l'union s'achève,
> L'âme alors retrouve la vue et la clarté,
> Et que, jugeant son oeuvre avec sérénité,
> Comprenant sans obstacle et s'expliquant sans peine,
> Comme ses soeurs du ciel elle est puissante et reine,
> Se mesure au vrai poids, connaît visiblement
> Que son souffle était faux par le faux instrument,
> N'était ni glorieux ni vil, n'étant pas libre;
> Que le corps seulement empêchait l'équilibre;

63 *Ibid.*, vol. 1, p. 628. ". . . il ne me reste rien qui me garantisse des mouvements violents de mon coeur; je le sens affligé, blessé, et tout prêt, par désespoir, à se dévouer pour une opinion politique et à me dicter des écrits dans l'intérêt d'une sublime forme de gouvernement que je vous détaillerai." The fact that Stello's mention of politics is significant is quickly recognized by Doctor Noir, who seems to have learned from Brierre de Boismont's pioneer opposition to the monomania doctrine (Semelaigne [note 23], vol. 1, p. 235) that a syndrome lurks beneath each psychological symptom. Stello retracts his suggestion of entering politics as a mere fleeting notion; but Doctor Noir's reply confounds pretense. "Poésie! poésie! cette idée, vous ne la laissez pas sortir par hasard; vous la caressez avec un attachement secret. Elle est . . . établie profondément en vous sans que vous en sentiez les racines plus qu'on ne sent celles d'une dent." Vigny (note 3), vol. 1, p. 688. (For a comment on monomania, see *ibid.*, vol. 2, p. 791.)

64 Vigny, *ibid.*, vol. 1, p. 627.

Et, calme, elle reprend, dans l'idéal bonheur
La sainte égalité des esprits du Seigneur.[65]

II. FROM DOCTOR BLANCHE TO DOCTOR NOIR

One of the reasons why we assume that the early nineteenth century was much less interested in psychology than we are is that we do not find in the Romantic authors words which we recognize as pertaining to psychology (e.g., "ego," "unconscious," "Gestalt.") The assumption therefore prevails that no serious interest in the discipline existed in literary circles prior to the development of the new set of terms.

Actually, it would probably be unusual to find a contemporary author spending a morning observing the dissection of a human brain, as Vigny did.[66] His habit of visiting mental hospitals has already been mentioned.[67] If his reading for *Stello* included the article "L'Hypochondre" in the *Revue britannique* for November, 1830, as Baldensperger suggests,[68] he was exposed not only to the description of psychiatric interviews and to the discussion of "mental organization" in the terms with which we have become familiar, but to an early description of electric shock therapy as well.[69] Furthermore, Vigny's visits to psychiatric clinics were not idle sightseeing. He took careful note of the behavior of the patients and drew theoretical inferences from what he had observed. "La force vient du cerveau dans l'homme. Je l'ai vu chez le Docteur Blanche où Eugène Hugo ne peut s'empêcher de salir ses vêtements."[70]

Just as any twentieth century author might do, Vigny associated intimately with two important psychiatrists: Emile Blanche and Brierre de Boismont. Blanche was guardian to a number of French Romantic poets, notably Gérard de Nerval and Vigny's friend Deschamps. Vigny's attitude towards Blanche is one of sincerest veneration.[71]

The medical study of the mind was sufficiently widespread in Vigny's time to enable him to predict a twentieth century develop-

65 From "La Flûte." Vigny (note 3), vol. 1, p. 202.

66 Vigny (note 3), vol. 2, pp. 1038-39.

67 See above, note 7.

68 Fernand Baldensperger in Vigny's *Stello* (Paris, Louis Conard, 1925, 455 pp.), p. 418.

69 Journal d'un médecin: l'hypochondre. *Revue britannique*, 1830, *n.s.* 3, 138-157.

70 Vigny (note 3), vol. 2, p. 974.

71 *Ibid.*, vol. 2, p. 1139. For Blanche's connections with the poets see E. de Crauzat, La Maison du Dr. Blanche. *Chronique médicale*, 1908, *15*, 545. Other references to Blanche in Vigny may be found in the *Lettres inédites d'Alfred de Vigny au Marquis et à la Marquise de la Grange* (Paris, Louis Conard, 1914, xvi + 163 pp.), p. 53; and the *Correspondance 1816-1863*, p. 259.

ment: the transference of the rôle of spiritual guide from the priest to the physician.

> Les médecins jouent à présent dans la société le rôle des prêtres dans le moyen âge. Ils reçoivent les confidences des ménages troublés, des parentés bouleversées par les fautes et les passions de famille. L'abbé a cédé la ruelle au Docteur, comme si cette société, en devenant matérialiste, avait jugé que la cure de l'âme devait dépendre désormais de celle du corps.[72]

It is after all not surprising to find Vigny, though living a century before the Freudian movement, declaring his point of departure in *Stello* to be "cette observation très simple que les hommes sont tous malades de la tête."[73] Nor is it surprising to discover in his novels a good many people with disturbed minds. Some of these, of course, are merely literary madmen.[74] A suicide such as Chatterton's, on the other hand, had certain connections with realistic psychology of which Vigny was obviously well aware. "Il serait bon que ce jeune homme mourût . . . parce que mieux vaut la mort que la folie."[75] "Il est atteint d'une maladie toute morale et presque incurable . . . c'est l'obstiné Suicide . . . il est rare que ces malheureux renoncent à leur projet quand il est arrêté en eux-mêmes."[76] Chatterton's suicide is clearly as much a product of his own psychology as it is of his circumstances.[77] The inspired poet is initially unstable—Lassailly could write only during his attacks of madness.[78] For his next work Vigny thought of being even more explicit: "Réunir l'idée du suicide à celle de la folie."[79]

Stello is the least conventional of Vigny's characterizations involving nervous illness. The analysis of his case in the "Caractère du malade" chapter is so plainly clinical as to be almost unliterary.[80]

72 Vigny (note 3), vol. 1, p. 659.

73 *Ibid.*, vol. 2, p. 950. On p. 791 Dr. Noir echoes Vigny: "Tous les hommes sont malades de la tête."

74 Gilbert in *Stello;* Jeanne de Belfiel in *Cinq-Mars.*

75 Vigny (note 3), vol. 1, p. 861.

76 *Ibid.*, vol. 1, p. 863.

77 Though Vigny tried to make it appear a homicide by society rather than a suicide by the poet in the introduction. *Ibid.*, vol. 1, p. 818.

78 *Ibid.*, vol. 2, p. 1139. Lassailly's madness resulted from "un travail excessif dans une organisation faible."

79 *Ibid.*, vol. 2, p. 974.

80 *Ibid.*, vol. 1, p. 624. "Il se trouve des jours dans l'année où il est saisi d'une sorte de souffrance chagrine . . . dont il sent les approches quelques jours d'avance. . . . Dans cet état, qui précède des douleurs nerveuses auxquelles ne croient jamais les hommes robustes et rubiconds dont les rues sont pleines, il était couché tout habillé sur un canapé. . . ."

With a few such exceptions, the style of the book is rather artificial than realistic. The introduction prepares the reader for an account in which neither characters nor settings are meant to convince us of their physical reality (*ibid.*, vol. 1, p. 623), and the pretense of realism is dropped entirely again as the book concludes (pp. 804-805). The aim of *Stello* being to combat illusion, it refuses to take advantage even of the literary illusion of "realism."

Sick with Romantic sentiment, Stello has fallen into a state of mind which demands the cautery of cynicism. Doctor Noir is fortunately there to wield it. Stello decides to engage the doctor in a conversation about his illness, for "la moitié de la guérison gît là-dedans";[81] but the treatment which Noir proposes offers him small comfort: "je vous guérirai en rendant plus complet le mal qui vous tient."[82] Such unsympathetic therapy Vigny may have seen employed by Emile Blanche with some of his excessively sentimental patients.[83]

Ludwig Feuerbach is neither a physician nor a physiologist; but he is the contemporary of Vigny chosen by Vigny's most respected commentator, Georges Bonnefoy, as epitomizing the most important elements of Vigny's sceptical psychology. As Bonnefoy puts it, "Vigny réfute le désir d'action . . . par la psychanalyse du désir d'agir."[84] He understood that "le but devenait moins pur lorsqu'on y allait pour une cause passionnelle, et toute cause, finalement, pouvait être ramenée à celle-là."[85] This impurity of spiritual goals is emphatically maintained by Feuerbach, who sees behind every purpose a passion which animates, makes arbitrary, and gives a quasi-real existence to the objects of desire.[86]

One can find more differences than resemblances between Feuerbach and Vigny;[87] nevertheless, Bonnefoy's point is of the greatest importance for an understanding of the character of Vigny's work and thought. Vigny was much more of a psychologist than is apparent from the rather artificial and conventional forms which his literary expression takes. And his scepticism is founded on just this disconcerting and pervasive psychological realism, a tenet whose equivalent in Feuerbach is similarly based upon his conviction of the physiological nature of "Geist," and its inseparability from corporeal processes.[88] Bonnefoy saw in the consciousness of the psychological foundation of every ideal a mjor cause for

81 *Ibid.*, vol. 1, p. 625.

82 *Ibid.*, vol. 1, p. 629. The implication: Stello's despair over the difficulty of reaching happiness must be changed into a sober acceptance of the fact that there is no such thing as happiness.

83 See the report of Jacques Arago, in Crauzat (note 71), p. 516.

84 Bonnefoy (note 7), p. 209.

85 *Ibid.*, p. 50.

86 *Ibid.*, pp. 149-150.

87 Feuerbach emphasizes the importance of man's material condition and the holiness of his natural functions far more than Vigny would do. See the *Sämmtliche Werke* (Stuttgart, F. Frommans Verlag [E. Hauff], 1903-11, 10 vols.), vol. 1, pp. 123, 160-161. His sceptical psychology, which resembles Vigny's particularly in the analysis of the immortality belief as wish-fulfillment (*ibid.*, vol. 1, pp. 121-122; see also Bonnefoy [note 7], pp. 149-150), merely echoes a French tradition of fifty years before.

88 "Der Mensch ist, was er isst." Feuerbach, as quoted in Owsei Temkin, Materialism in French and German physiology of the early nineteenth century. *Bull. Hist. Med.*, 1946, 20, 327. Cf. Gall's observations on diet (note 20, p. 274).

Vigny's pessimism.[89] At the same time it was, of course, a powerful agent for the decomposing of values, a solvent for happiness and truth alike.

This extended consideration of the neurological antecedents of Vigny's scepticism will serve as an introduction to the sinister yet sympathetic figure of Dr. Noir, the final object of our study. He is the "rude médecin des âmes"[90] who breaks in on Stello's solitude as he lies prostrate on his couch at the depth of his depression. Impervious to all forms of sentiment, Noir undertakes to bring Stello's logos back to the realms of dispassionate understanding.

What are the attributes of Doctor Noir which qualify him for this task? Above all, he has the sagacity to expect nothing of life. He extirpates any trace of hope or illusion which appears in him, setting aside his responses to the painful impressions of his practice by "la grande habitude que j'ai de dompter ma sensibilité."[91] Doctor Noir has a right to this refusal of emotional participation, since he has himself "dès longtemps fait l'abnégation totale d'une vie qui fut toujours triste."[92]

Noir's cheerful pessimism, or macabre cheerfulness, is the chief diapason of the book. But a large share of Noir's pessimism is really Stoicism; a pessimism of method rather than of purpose. Noir has realized that the only criterion for the correct understanding of life is the viewpoint of the unhappy man. By accepting such illusions as happiness and hope one falls into the contradictions that soon make life unendurable. In this case the psychiatrist will be needed to set one back on the road to the only viable concept of existence.

Doctor Noir's therapeutic method shows a remarkable similarity to the treatment of mental illness suggested by the Stoic theorist Chrysippus. Chrysippus held that there was just as much need of doctors for the soul as for the body.[93] The expectation of happiness from the conditions of the external world is the common cause of psychopathic states; and like the physician, the alienist must ignore the patient's particular philosophy in treating him.[94] The infallible

89 Bonnefoy (note 7), p. 50.

90 Vigny (note 3), vol. 1, p. 652.

91 *Ibid.*, vol. 1, p. 649. See e.g., p. 774, when Dr. Noir controls his reaction to André Chénier's execution.

92 *Ibid.*, vol. 1, p. 754.

93 See above, note 8. Stello too is of this opinion. When he sees Noir he exclaims: "Ah! Dieu soit loué! . . . c'est vous, vous qui êtes le médecin des âmes, quand il y en a qui le sont tout au plus du corps." Vigny (note 3), vol. 1, p. 625.

94 See von Arnim (note 8), fragment 124, line 37.

cure is to convince the sufferer that "the emotions are inherently objectionable, and have nothing natural or essential about them."[95] Doctor Noir prepares Stello for the account of Chatterton's misfortunes (an object-lesson to Stello) with just such a exhortation:

> Vive Démocrite! d'habitude j'aime mieux qu'on ne rie ni ne pleure, et qu'on voie froidement la vie. . . . C'est vraiment par trop estimer la vie que la pleurer: les *larmoyeurs* et les *haïsseurs* la prennent trop à coeur. C'est ce que vous faites, dont bien me fâche. L'espèce humaine, qui est incapable de rien faire de bien ou de mal, devrait moins vous agiter par son spectacle monotone.[96]

Pitiless in his crusade against illusions, Noir chooses the moment when Stello is most deeply moved after hearing the account of Chatterton's death to level one of his cruellest blows at Stello's sensibility.

> Que m'importe cet instinct de tendresse angélique auquel vous vous livrez tout d'abord, à tout sujet? . . . Remettez-vous, monsieur, les larmes troublent la vue.[97]

And Stello's guilty start proves that there has after all been more slack, unorganized sentiment than stoic understanding in his response. "Stello revint s'asseoir brusquement, baissa les yeux, puis les releva pour regarder son homme de travers."[98] The Doctor's shaft had found its mark. Stello has not yet grasped the significance of all the tales which Noir relates: "L'espérance est le plus grande de nos folies."[99]

Stello is unhappy because he is ignorant. "The cause of all emotions is confusion over the true values of life, 'Agnoia'."[100] He is in the position of so many of us whose misfortune it is to think we are happy when we feel we are unhappy. Our minds have chosen the wrong goals, and having made objectives of our errors we contribute to our own downfall. It is not until our misconception of the nature of happiness has been rectified that we can be freed from the crippling unhappiness which attacks us through our emotions. But this liberation must be brought about through the understanding, since our unhappiness is the result of the failure of understanding. "One must above all realize that the reasonable being is intended by nature to obey the Logos and to act according to the

95 Pohlenz, Max. *Stoa und Stoiker* (Zürich, Artemis-Verlag, 1950, xxix + 386 pp.), p. 160. (My translation.)
96 Vigny (note 3), vol. 1, p. 665.
97 *Ibid.*, vol. 1, p. 687.
98 *Loc. cit.*
99 *Ibid.*, vol. 1, p. 803.
100 Pohlenz (note 95), p. 158. (My translation.)

instructions of the Logos. . . ."[101] As Noir puts it, "Si Dieu nous a mis la tête plus haut que le coeur, c'est pour qu'elle le domine."[102] And when we are on the right road to understanding, we will be freed for rational and fruitful action.[103] Only then can we carry out our "ordonnance."[104]

Step by Step Doctor Noir hunts down and remorselessly despatches Stello's illusions. Noir's standard techniques are an unremitting intellectual scepticism, a disconcerting readiness to satirize the most sympathetic characters in his stories, and an attitude of icy indifference towards the suffering he describes. No opportunity to insult Stello's sensibilities is missed. The pitiful Gilbert on his death-bed, his mind wandering, is pleading with the Philosophes who have robbed him of both reason and faith. "Raison d'école à rendre le diable fou! Ah! d'Alembert, joli pédant, que tu me tourmentes!"

"Il ajouta ceci en se grattant l'épaule," Doctor Noir puts in.[105] The unhappy old M. Chénier is wandering around in servant's clothes looking for any expedient to save his son from the guillotine. Noir interrupts his appeal "en lui secouant le bras pour le réveiller du radotage qui commençait à l'assoupir";[106] when, in pitiful confusion, the old man rejects his judicious advice, Noir explains his objections as a result of "ce misérable instinct d'une volonté myope qui surnage en nous quand toutes nos facultés sont englouties par le temps. . . ."[107] Stello, in turn, is presented to the reader in a shabby pose. After all the Consultations, Stello rises to his full height to protest; but how? "comme on fait quand on veut se montrer tout entier, avec une secrète satisfaction de soi-même, et il jeta même un regard sur une glace. . . ."[108] Nor does Noir himself escape quite unsullied.[109] No hint of pretense goes unchallenged, no moral weakness or even venial slip unchastized.

101 *Ibid.*, p. 150. (My translation.) For the Greek see von Arnim (note 8), vol. 3, fragment 462. (Chrysippus.) The Stoics were committed to psychiatry almost by definition, since they occupied themselves with the *disease* of emotion. (Greek makes emotion practically synonymous with disease in the word *παθος*.)

102 Vigny (note 3), vol. 1, p. 688.

103 There is a very positive side to the Stoic program. "Die stoische Apathie bedeutet nicht etwa wie Epikurs Ataraxie den Verzicht auf Aktivität; sie soll im Gegenteil erst die richtige Tätigkeit des Logos ermöglichen." In Max Pohlenz. *Die Stoa: Geschichte eines geistigen Bewegung* (Göttingen, Vandenhoeck und Ruprecht, 1948, 2 vols.), vol. 1, p. 152.

104 Vigny (note 3), vol. 1, p. 800 ff.

105 *Ibid.*, vol. 1, p. 640.

106 *Ibid.*, vol. 1, p. 702.

107 *Ibid.*, vol. 1, p. 705.

108 *Ibid.*, vol. 1, p. 798.

109 *Ibid.*, vol. 1, p. 738. Noir, hurrying to save André Chénier, is "emporté par la crainte d'arriver trop tard," but also "un peu par la pente de la rue."

The unique touch in this book which sets it apart from all of Vigny's other works is its dry refusal to acquiesce in his own penchant for sentimentality. When Baldensperger remarks that certain ecstatic nocturnal visions of Vigny's were slightly abnormal,[110] he is only discovering what our author, in *Stello,* gives ample evidence that he already knew. These mildly morbid "élévations" represent a temporary loss of awareness that other states of mind will result in other opinions; they follow upon the acceptance of a temporary set of ideals, poorly founded in reality, as final. We fall into error whenever we seek the ideal anywhere other than in ourselves. Vigny's glimpses of the ideal in certain mystic visions are comparable to Stello's unsound enthusiasm or political Utopianism; they are merely the rationalization of the goal in a false state of ecstacy. *Stello* shows that Vigny knew this to be so, and cast his lot with truth.[111]

For the purpose of the radical analysis to which he had to submit himself (Stello), one of the most powerful tools was methodical doubt.[112] Doctor Noir is a past master of sophistic argument.[113] And Doctor Noir can degrade Stello's values (though never his own) to infinitesimal minuteness. He is "armé contre les idées,"[114] and he never articulates his own assumptions, for he knows that like all propositions they would then be vulnerable too.[115] But like Julien or the other "enthousiastes" who, dissipating superstition, leave behind them nothing but materialism,[116] Noir, discarding values in his effort to rid Stello of the false idealism which imagines a tangible goal[117] (the equivalent of idolatry in religion), leaves him for the time being nothing but his physical existence. Doctor Noir too is a dangerous "enthousiaste."

Have we unmasked "Le Docteur Noir?" Not entirely. Vigny himself does not succeed in doing so. "Le Docteur Noir, c'est la vie. . . . toujours le malade doit être supérieur à sa triste raison de tout ce qu'a la poésie de supérieur à la réalité douloureuse qui nous

110 *Ibid.,* vol. 1, p. 32.

111 See also *ibid.,* vol. 2, p. 1205.

112 See above, text following note 104.

113 Vigny (note 3), vol. 2, pp. 944-945.

114 Vigny (note 68), p. 425.

115 Vigny generalizes about modern man from his own policy. "Il ne croit pas toujours et il n'affirme plus. Quelle est l'idée qui soutient son courage? Il ne le dit même pas." In his *Journal d'un poëte* (Paris, Michel Lévy Freres, 1867, 307 pp.), p. 264.

116 In Doctor Noir's *Deuxième consultation: Daphné,* Vigny endeavored to show that religious purists ("enthousiastes") do more harm than good. In the name of a mystic vision incomprehensible to the masses, who require idols to adore, they destroy men's belief in divinity itself by attacking their belief in tangible divinities. See Bonnefoy (note 7), p. 234.

117 See above, note 62, *et seq.*

enserre."[118] But the acrid Doctor Noir is the one character in all of Vigny who does give one a feeling of soundness, of reliability; though melancholy himself, he radiates not gloom but clarity. And no one who has read *Stello* will feel that Doctor Noir is inferior to his patient; on the contrary, he is Stello's real source of strength. In the end it is he who writes the prescription for the poet. ". . . cette raison selon la vie [Doctor Noir] doit toujours réduire le sentiment au silence et ce silence sera la meilleure critique de la vie."[119] After all, we end with Noir; with a "critique" and a "silence." Stello may have been a dialogue of "mon coeur et ma tête";[120] but the better part of Vigny's "coeur" was always situated in his "tête."

Vigny has not identified "Le Docteur Noir" for us; and no one can. This is because Doctor Noir himself knows that people cannot be defined. Neither their values nor their characters remain constant in different contexts. Their modes of change may be described, but not their "selves." It did not take Vigny a whole lifetime to detect the flaw in the wise maxim he had so often quoted. Doctor Noir had seen it long before Vigny confessed that it was there. "Un sage a dit: *'Il faut soi-même se connaître.'* J'ajoute: 'S'il se *peut!*' Nos miroirs sont troublés."[121] Doctor Noir knows that no one can know himself. Therefore, admitting to no summary or "synthèse" of himself, he cannot entirely be known. This is the last irony in the quest for knowledge of "un aveugle éternel tel que l'homme:"[122] in the last analysis his search for self-knowledge is as vain as his aspiration to an understanding of the external world.

"Le *Doute* n'est pas le *Scepticisme.*"[123] This faint thread of distinction is all that remained to Vigny of his idealism after a lifetime of struggle for one solid value to be firmly grasped. But this thread, so fine as to be almost invisible, is the frontier of an inexpugnable truth. This we cannot drive him to abandon.

"Le *Doute*" is a perpetual quest; "le *Scepticisme*" is a denial that there is anything to search for. "Le Doute" never results in an affirmation, but "Derrière lui seul est en sûreté la *Raison,*"[124] and Vigny is content with this support. The essence of scepticism is in-

118 Vigny (note 3), vol. 2, p. 969.
119 *Ibid.*, vol. 2, p. 969.
120 *Ibid.*, vol. 1, p. 805.
121 *Ibid.*, vol. 2, p. 1386. (1863.)
122 *Ibid.*, vol. 2, p. 1359. (1860.) Concerning "synthèse" see above, note 11.
123 *Ibid.*, vol. 2, p. 1377. (1862). Also p. 1383: "le *Doute,* vrai destin de l'homme, n'est pas la même chose que le scepticisme. . . ."
124 *Ibid.*, vol. 2, p. 1377.

difference; at the root of the philosophy of doubt lies a passion for honesty. Thus Vigny is almost but not quite a sceptic. There is one value he has retained: the value of honesty; and it is all the more unassailable because it is never articulated. A tacit assumption of his intellectual method, it is the essence of the methodology of doubt.

Doctor Noir's logic has led us directly to his ethic. "Affirmer dans le songe" is folly or dishonesty; but "Affirmer la morale, . . . cela vous est permis."[125] We can now see that Vigny's concern with neurology in *Stello* did not have as its purpose to demonstrate that human behavior is nothing but the convulsions of inert matter. The reduction of ideals to physiology was introduced to show that honesty can afford to sacrifice even ideals for the sake of truth. This apparent cynicism contributed to Vigny's campaign against dishonesty, which Vigny saw must be assailed in every guise. For even if we cannot ever know ourselves entirely, only to the extent that we accept the truth about ourselves can we know ourselves at all. Doctor Noir's ethic is not based on any cynical materialism. It is the profound and tragic ethos of agnostic science. Without abandoning idealistic principles it has renounced their praise as futile, convinced that the comfortless probing of accepted precepts which may lead to greater control of human experience is better evidence of idealism than the most enthusiastic acclaim of the accredited virtues.

In the battle between the Gods and the Giants, Vigny remains a quizzical observer. Neither materialist nor idealist, he shows his faith in life by asking questions. His greatest prose work, *Stello,* is reluctant to confirm illusions even through literary realism. It asserts its trust in reality only indirectly, by abolishing in the end any illusions of reality which the narrative may have imposed upon the reader.[126] With similar disinterestedness, Doctor Noir, Vigny's most responsible exponent, illustrates an absolute ideal by sacrificing the Absolute to truth.

125 *Ibid.,* vol. 2, p. 1377.
126 See above, note 80.

American Association of the History of Medicine

Twenty-seventh Annual Meeting, 6-8 May 1954
New Haven, Connecticut

ABSTRACTS OF PAPERS PREPARED BY STUDENT EDITORS OF THIS JOURNAL

Symposium on the Rise of Statistics in Medicine

Richard H. Shryock, *Presiding*

1. Problems in the Application of Statistical Analysis to Questions of Health: 1750-1880. *George Rosen,* New York City.

The foundations of modern statistics were laid in the seventeenth century by William Petty and John Graunt. Despite the lack of adequate numerical data there were many practical and theoretical contributions during the next hundred years, including the development of probability theory and life tables. By 1800 considerable knowledge was accumulated. Statisticians were aware of regularities in vital statistics and there was some knowledge of the importance of sampling errors. During the next fifty years there was an increasing number of studies of health problems of high quality and sound nosography. Quetelet brought together the statistical knowledge of that time to develop a statistical methodology and he undertook to show its application in practice. Particularly important are his contributions on limits of variations and the concept of "l'homme moyen."

2. Demographic Data and Medical History: Sweden as a Case Study. *Odin W. Anderson,* New York City.

The data necessary to show interrelationships of disease and social factors may be organized into four groups: characteristics of the population, level of social and technical development, patterns of disease as measured by mortality, and level of medical development. Swedish data show well the general patterns of vital and social indices from 1750 to the present for several reasons. They are the earliest continuous record of such data; except for heavy emigration during the latter part of the nineteenth century Sweden has escaped violent external influences, while keeping abreast of scientific developments; and there has been gradual evolution from a primarily agricultural to a well-balanced agricultural and industrial economy.

3. The Early History of Vital Statistics in Massachusetts. *John B. Blake,* New Haven, Connecticut.

In 1639 Massachusetts first established civil registration of births, marriages, and deaths. It was, however, rarely enforced, and the first significant American contribution to vital statistics, except in connection with variolation, was Wigglesworth's life table of 1792. During the next fifty years an increasing number of statistical reports were published. In 1842 as a result of the efforts of Lemuel Shattuck and others, the General Court of Massachusetts required annual reports of all births, marriages, and deaths. Continued efforts led to better collection and preparation of the data so that the Massachusetts Registration Reports now comprise a valuable series of more than one hundred years. Shattuck also compiled a masterful census of Boston and a plan for promotion of public and personal health. During the 1840's and '50's the chief value of vital statistics was in promoting sanitary reform. In consonance with the spirit of the age the reformers stressed the expected moral and social benefits as well as the improvement of the public health.

4. The Rise of Experimental Statistics in Recent Times. *Donald Mainland,* New York City.

The starting-point of experimental statistics was the paper published in 1908 by "Student" on "The Probable Error of a Mean." The far-reaching contributions of Fisher, especially on significance testing and on experimental design and randomization initiated a revolution which is still continuing. It is important to note that this revolution has been almost confined to the applied sciences. Despite the increasing use of statistical arithmetic in medicine, there has been a lack of sound investigation and inference. The causes of this include the roots of medical science in academic chemistry and physics, the obscurity of statistical literature, and the tendency to use mathematical gadgets instead of thought. Further difficulties arise from problems of biased samples and because much research on human beings must be non-experimental.

JOHN C. BAILAR, III

SYMPOSIUM ON THE INTERRELATIONS OF CHEMISTRY AND MEDICINE

Joseph S. Fruton, *Presiding*

1. Medicine and Graeco-Arabic Alchemy. *Owsei Temkin,* Baltimore, Maryland.

Greek writings of the period 300-700 A.D. show the absence of any significant connection between medicine and alchemy, the latter dealing mainly with the transmutation of base metals and minerals. As late as 900 A.D. Greek medicine remained free from the influence of alchemical thinking in theory and practice. Greek alchemy beyond 500 A.D. was

strongly influenced by the writings of Aristotle and merged closely with natural philosophy of the period. It was in the east that alchemy made real inroads into the field of medicine. The years 750-900 A.D. mark the Arabic period of development, and important sources here are the writings of Gabor and Rhazes. The elixir as a curative and restorer of life was of Arabic origin, whereas the Greeks had ascribed purely mineralogical powers to it. Treatises on medicine referred to alchemical techniques, and alchemists frequently cited physicians as authorities. The production of medicinal remedies and cosmetic items was extended by use of procedures alchemical in origin. Observations of this sort indicate that the meeting of medicine and alchemy was achieved by about 900 A.D.

2. Chemical Considerations in the Development of Theories of Digestion in the Seventeenth Century. *Robert P. Multhauf,* Baltimore, Maryland.

This paper was concerned mainly with the criticism by van Helmont (1577-1644) of the Galenical theory of digestion and his elaboration of a new theory which was basically a chemical process. Van Helmont differed from the schools on essentially two points, the replacement of the heat of the spleen by a first ferment and the action of gall in preparing chyle for the liver. New and specific rôles were ascribed to the spleen and gallbladder. The former supplied the acidic or first ferment and the latter gall to counteract the first which was thought to be noxious in character. The key to the new theory was neutralization in an acid-alkali fashion to follow the acidic fermentation and prepare the chyle for the liver. Although van Helmont's ferments derived ultimately from those of the schools, the significance here is in ascribing to them for the first time a rôle in a chemical neutralization type of digestion.

3. Antoine Laurent Lavoisier: His Contributions to Medicine and Public Health. *Herbert S. Klickstein,* Baltimore, Maryland, and *Denis I. Duveen,* New York City.

Antoine Lavoisier (1743-1794) published no less than seventy-three papers covering twenty-three topics in public health and medicine. His contributions derived both from researches in the physical sciences and the adaptation of technical findings to the health needs of people and communities. Meteorology, lighting, mineralogy, water supply, and hydrometry were topics of early papers, preceding the classical experiments on combustion. After 1777 there appeared papers on animal respiration, carbon dioxide, and animal discomfort, respiration as slow combustion, and the identification of marsh gas (methane) as the noxious substance of cesspool putrefaction. Outstanding public health accomplishments are embodied in the reports to the Academy on prisons (1780) and hospitals (1786). The former dealt with conditions in Paris prisons and recommended new structures with improvements for cleanliness, water supply, air circulation, and prisoner regimen. The latter, con-

cerned mainly with the Hôtel Dieu, proposed decentralization into smaller units and provided construction details for sewage, water supply, ventilation, heating, etc. Work on the new hospitals was actually undertaken but abandoned during the revolution.

4. The History of Chemotherapy. *Perrin H. Long.*

The year 1954 is the centennial of the birth of Paul Ehrlich, the founder of chemical therapeutics. Throughout the late nineteenth century no other man so singlehandedly dominated a scientific field as did Ehrlich in pharmacology. The early history of chemotherapy is essentially a recounting of his achievements. The introduction of organic arsenicals for the treatment of syphilis commonly overshadows his many other important contributions. Mention of a few such instances shows as well the diversity of Ehrlich's brilliance: use of the dye methylene blue in malaria as the first synthetic compound in therapeutics, methods for standardization and production of diphtheria antitoxin, the chemical side chain theory of immunity, and the first successful staining of the tubercle bacillus. Relatively less advancement followed after Ehrlich's death until 1935 but the Germans still dominated with Primaquine for malaria and Suramin for trypanosomiasis. A great impetus was then given by Domagk who showed the antibacterial action of prontosil, a sulfonamide precursor, in streptococcal infection. Woods in 1941 demonstrated the mechanism of action to be competitive inhibition of p-aminosalycilic acid and so introduced a new concept of action. Fleming's casual observation in 1928 and ten years later Florey's isolation and discovery of the uses of penicillin mark the transition to the age of antibiotics.

LOUIS A. CORVESE

GENERAL SESSION

Douglas Guthrie, *Presiding*

1. Franz Joseph Gall and his Collection. *Erwin H. Ackerknecht,* Madison, Wisconsin.

Franz Joseph Gall (1757-1828) was a notable French comparative anatomist, best known for his work with the central nervous system. He was one of the earliest to equate organic brain disease with the symptoms of mental dysfunction. In his work on cortical localization he postulated 27 qualities, only two of which have subsequently been experimentally proven. Gall felt that the brain was a bundle of 27 separate organs which presided over the individual's traits; the size of these bundles determined which of the traits were dominant and thus responsible for the personality of the individual. He felt that the protuberances on the skull were a measure of the size of the "bundle" and he was thus responsible for the development of phrenology. He influenced later French psychiatrists

who used his physical explanations of mental illness as a basis for theoretical psychiatry. An outstanding contribution of Gall's was his collection of plaster heads of the skulls of many of his contemporaries. Included in the collection, now in Paris, are the heads of 103 celebrities, 69 criminals, 67 psychotics, 35 pathological cases, 25 normals—including some of his co-workers—and others of medical or esoteric interest. Slides were shown of some of the more interesting of these.

2. Plague and Politics. *Ilza Veith,* Chicago, Illinois.

The recent bacteriological warfare accusations of the Chinese Communists have interesting parallels in history. In 1348 plague followed an English invasion of France, and the French charged the English with deliberately spreading the disease. Again in 1896, the Indians accused the English of spreading plague and cholera to assist in their subjugation of India. Prior to the introduction of Western medical ideas regarding the germ theory of disease, India and China regarded plagues as heaven-sent visitations and never inquired into the cause. China is regarded by many epidemiological authorities as the ancient center of plague, and in 1941-1944 (the last years of reliable figures), there was a normal death rate of 700 per year from plague in China. There were charges by the Chinese Communists in 1944 that Japanese planes were spreading plague, but the Nationalist Government did nothing about it. In 1949, the USSR tried 12 Japanese for bacteriological warfare in China. In 1952, the Reds accused the U.S.A. of new outbreaks in Korea. The evidence for these charges was based on reports of three outbreaks, and was of the flimsiest nature. Peasants heard a low-flying plane at night, saw a "strange" rat within the week, and had one or two deaths in their village from "fever and headaches." No sound, concrete, impartial bacteriological evidence was ever presented.

3. Dr. William Kitchiner and his Cook Book. *Betsy Copping Corner,* Baltimore, Maryland.

Dr. Kitchiner was an eccentric nineteenth century physician, who, having a private income, never actually practised medicine. He was the author of several volumes on telescopes and optics and he designed a popular telescope. He also wrote several books on travelling by foot, horse, carriage, etc., with advice on how to be prepared for the rigors of the road. He is perhaps best remembered for *The Cook's Oracle* which was first published in 1817. American editions were published in 1822 and 1855, and it was probably the most popular cookbook of its day. Dr. Kitchiner wrote his text because he thought that poor preparation of food was responsible for much of human disease. He included in the text, besides recipes, social etiquette, homilies, home medical advice, and famous or appropriate quotations. Unique among cookbooks of the period in giving exact, measurable proportions in the recipes, it illustrated Dr.

Kitchiner's belief that each meal was a scientific experiment and that only with precise amounts could the experiment succeed. He was widely known in England as an epicure and a wit, and invitations to his frequent dinners were eagerly sought.

4. Luigi Carnaro, A Renaissance Writer on Personal Hygiene. *William B. Walker,* New Haven, Connecticut.

Luigi Carnaro (1467-1565) was the only man who adopted a special diet and lived to be 100 years old. He was a successful Italian agriculturist and patron of the arts who initiated early public works projects such as draining swamp land. At the age of 35 he was told by his physicians that due to youthful excesses and dissipations he had not long to live. This apparently sobered him, and he began his famous health regime, which he continued for the next 65 years. His advice was to "avoid temperature changes, fatigue, venery, disturbances of routine, and bad air, and to endeavor to control the emotions." His diet consisted of 12 oz. of bread, egg yolk, and meat, and 12 oz. of wine a day. This diet is now felt to be deficient, not only in calories, but in roughage and Vitamin C. It was thought that Carnaro suffered from periodic scurvy, which was cured when the new wine came in. Carnaro published his advice in a Treatise (written at age 83), a Compendium (age 86), a Letter (age 91), and an Exhortation (age 95). These were later all gathered in one volume, *Discourses on a Sober Life.*

5. The Studies of Jacob Helm (1761-1831) on Human Chymology. *Bruno Kisch,* New York, New York.

This paper is published in this issue of the JOURNAL.

6. The William Beaumont Memorial on Mackinac Island. *Alfred H. Whittaker,* Detroit, Michigan.

A report of the restoration of the home of William Beaumont on Mackinac Island, the place where Beaumont first met Alexis St. Martin, was made. Slides were shown of recent acquisitions to the museum and of the restoration.

ROBERT J. T. JOY

SYMPOSIUM ON THE HISTORICAL IMPACT OF CURATIVE MEDICINE ON SOCIETY

Erwin H. Ackerknecht, presiding

1. Antisepsis as Related to Curative Surgery: An Historical Treatise. *William W. L. Glenn,* New Haven, Connecticut.

Dr. Glenn pointed out that six-fold increase in the population of the United States during the past one hundred years and the extension of the life span from fifty years in 1900 to nearly seventy years in 1953 came

about through medical, surgical, and public health measures. He touched first on the introduction of surgical anesthesia, mooted in the early 1840's and recognized after the celebrated operation carried out under ether at the Massachusetts General Hospital on 16 October 1846, and first published a month later in the *Boston Medical and Surgical Journal* of 18 November 1846 (Vol. 35, pp. 309-317). Dr. Glenn also appropriately touched upon the great medical educators of the second half of the nineteenth century, including Charles Eliot, the President of Harvard, who introduced laboratory instruction in the medical curriculum, and Weir Mitchell who had done so much to modernize medical instruction at the time of the Civil War. Dr. Glenn's appraisal of the contributions of Pasteur and Lister is given in fine and historically sound perspective, especially as regards his carefully worded statement concerning the introduction of antisepsis and asepsis. The full text of Dr. Glenn's paper is being submitted for publication in this *Journal.*

2. Pronouncements of August Bodies: or, The Struggle of Ideas. *John P. Peters,* New Haven, Connecticut.

This entertaining paper has to do principally with French and other scientific organizations which felt impelled to offer official edicts concerning early studies on blood sugar, and later the further prenouncement of the medicinal uses of iodine. Claude Bernard becomes a special target of Dr. Peters' light-hearted invective when, following the announcement by Figuier in 1855 that glucose could be demonstrated in all parts of the circulating blood, the French Academy announced that since the great Bernard had found sugar only in blood from the hepatic vein there obviously was none elsewhere and "nonsense to the contrary should really cease. Being thus armed with the coat of augustness by the French Academy, Claude Bernard was enabled to dispose of the vulgar upstarts who persisted in the pernicious discovery of glucose where it obviously was not . . ." Dr. Peters relates a similar story in the case of the use of iodine when "Kocher's pronouncements carried more weight than did his facts." Clearly Dr. Peters should devote more of his time to medical history!

J. F. F.

3. Homines ad Deos: or, The Medical Bull in the Ecological China Shop. *Iago Galdston,* New York, New York.

Ever since its renaissance in Paracelsus, curative medicine has been in the ascendancy. It gradually displaced more ecologically oriented opponents, such as the Romantics, anticontagionists, and therapeutic nihilists. With the advent of Pasteur and the decline of Viennese medicine it has come to be the chief motivating force and guiding principle of medical practice.

Despite its great contributions to medicine as a science the curative approach is raising havoc, because of its non-ecological orientation. It succeeded in turning much of mortality into morbidity, with a tremendous rise in chronic illness. The practitioner suffers too, because of the false sense of security which results from the availability of cures with incomplete knowledge and understanding of etiology.

4. Impact of the Orientation of Medical Teaching on Curative Medicine and Society. *I. Snapper,* Brooklyn, New York.

The foundations of modern clinical medicine were laid in Padua in the mid-sixteenth century. In another hundred years bedside teaching came to be the key to medical education in Leyden, where Boerhaave successfully combined clinical with *ex cathedra* instruction. However, soon after his death the empirical method declined and with it the quality of teaching.

Throughout the history of medical education the ascendance of the scientific objective approach always resulted in the suppression of clinical teaching. Its revival always was the work of one or a few devoted empiricists. The losses incurred would have been even more severe had it not been for these few. Van Swieten in Vienna and Shippen in Philadelphia were some of these links who maintained and revived bedside teaching. Another decline of empirical, bedside medicine may well be in the making, as a result of the current isolation of so many teachers by turning them into full-time academic personnel, and the new emphasis on the mathematical approach.

NICHOLAS A. HALASZ

GENERAL SESSION

Frederick G. Kilgour, *Presiding*

1. Health Insurance in New France: A Footnote to the History of Medical Economics. *A. D. Kelly,* Toronto, Canada.

Modern voluntary prepaid medical insurance plans have counterparts in seventeenth century Canada. A document now in the Archives of the City of Montreal describes a contract dated 1655 wherein a Dr. Bouchard agrees to furnish comprehensive medical care for thirteen families, for an advance fee whose modern equivalent would be one dollar per family insuring the doctor's services for one year. Epilepsy, plague, smallpox, lithotomies, et cetera were specifically excepted, and provisions for termination of contract were included.

Another contract, dated 1681, requires two surgeons to provide complete medical and surgical care to the indigent patients of a charity hospital upon payment of a yearly fee fixed by the hospital in advance.

2. The Historical Relations of American Dentistry and Medicine. *L. Laszlo Schwartz,* New York, New York.

Medicine and dentistry are historically intertwined, although the accessible, mechanical aspects inherent in the latter have often separated it from the former as various general theories of medicine and disease flourished. American dentistry, drawing its members at first from all walks of life, began to organize and develop rapidly in the nineteenth century, which saw the establishment of recognized dental schools, anesthesia, mass-produced porcelain teeth, and oral surgery as a specialty at a time when medicine was still concerned with the humoral theory of disease and therefore, for the most part, separate from dentistry. As medical knowledge began to flourish, however, dentistry's achievements remained mainly technical until Hunter gave prominence to the theory of focal infection in 1911. Scientific advances such as fluoridation and educational experiments in which medical and dental training are interrelated are forerunners, perhaps of the future medical acceptance of dentistry as a medical specialty.

3. A Plea for Constructive Speculation. *E. G. D. Murray,* Montreal, Canada.

The enormous volume of modern scientific reporting, both in scientific literature and in the popular press, has obscured the scientific and intellectual advantages to be gained by careful speculation which is based on discriminating awareness of the historical development of any given aspect of scientific knowledge. This is especially true of bacteriology, because no comprehensive history is available. The possible medical and theoretical implications of Cunningham's work on the spirochetes of relapsing fever with regard to present knowledge of cytoplasmic inheritance is an example of the application of historical knowledge to present advances.

MILTON CORN

4. Drug Measurement in Antiquity. *Chauncey D. Leake,* Galveston, Texas.

The earliest recipes for medication seldom specified the amounts to be administered, the Ebers Medical Papyrus, which dates from 1500 B.C., being the first record to contain a large number of quantitated recipes. In these it is interesting to note that no toxic drugs are specified, nor are toxic amounts of useful drugs prescribed. The system of measurement was based on a series of references to body proportions, with the *Ro,* or drug-measurement, system taking its basic unit as the mouthful, roughly equivalent to our tablespoonful. By halving or doubling this unit a series of other quantities could be built up; these are similar to present-day household measures. Conversion between the other two systems—the *Hnw* for beverages and the *Hk.t* for grain—is marked by the Horus Eye hieratic, for a long time an unexplained symbol in the papyri. Thus there existed in Egypt, one and probably two millennia before the birth of Christ, the beginnings of a rational pharmacology.

5. Recent Studies of the Younger Freud. *Richard L. Schoenwald,* Brunswick, Maine.

Like many another great and controversial figure who still looms impressively in the memories of a succeeding generation, Sigmund Freud has suffered at the hands of his biographers—the hostile ones, the uninformed, the adulators intent upon creating a *légende*—and a good deal remains to be done by way of presenting an accurate, complete, and perceptive account of his life and his novel discipline. There are many resources which are only now being exploited: Breuer's autobiography, Freud's unpublished works, the Sigmund Freud archives, his letters. These as well as the milieu in which he made his discoveries have yet to be fully explored. In this country, Ernest Jones's biography and assessment in process promise to become the first significant steps in this direction.

6. Shakespeare and Sleep as a Medical Problem. *Simon B. Chandler,* Morgantown, West Virginia.

Throughout all Shakespeare's works there are many, many references to sleep, and these may be counted and classified, if counted and classified they must be, into four categories, namely, normal sleep, disturbed sleep, sleep following the administration of drugs, and sleep likened to death. The question then arises, why so much about sleep? Does not this preoccupation with that state suggest that the author was, for instance, plagued with many interminable nights of troubled sleep? Does not this in turn raise the possibility that Shakespeare was fully as disturbed as certain of his characters? These, of course, are the sort of questions posed every so often by some psychoanalysts—more, we hope, for their own diversion than out of conviction. And the answer is the obvious one: that Shakespeare wrote so much about sleep of all kinds because sleep, of all kinds, is one of the chief occupations of men, Elizabethans not excluded. To regard the events and personalities of Shakespeare's plays as projections of the author's own life and characteristics is a singularly naïve procedure, most often a highly selective and unbalanced approach which hardly does justice to Shakespeare's imagination, knowledge, or poetic ability.

JOSEPH S. PAGANO

GARRISON LECTURE

John F. Fulton, *Presiding*

The Decline of Chronic Infectious Disease and Its Social Implications. *Esmond R. Long,* Philadelphia, Pennsylvania.

Increasing world population and average life expectancy are partially attributable to the decline in chronic infectious disease. The incidence of tuberculosis, which has waxed and waned for centuries, has been

steadily decreasing in modern times because of a higher standard of living, public health measures, improved surgery, and chemotherapy, and will probably continue to decrease. Malaria, estimated to affect three hundred and fifty million people at the present time, has shown a decreasing incidence for the past three hundred years, most marked in modern times, as information about etiology, control, and treatment has become available. Syphilis, while still endemic in some areas where nonvenereal contact perhaps plays a rôle in maintaining the disease, has been remarkably well controlled by penicillin, with a proportionate decrease in mortality and mental complications, although the transition from a rapidly fatal disease of bones and skin to a chronic process affecting the vascular and nervous systems has been taking place for centuries. Yaws, which is also susceptible to penicillin, will probably also become increasingly controlled. Greater use of shoes, privies, and therapy can be expected to decrease the incidence of hookworm. Leprosy, known for three thousand years, has receded as civilization has advanced, and for unknown reasons has been gradually changing its manifestations from the lepromatous to the tuberculoid form. Although three to five million, mostly in China and Asia, are estimated to be affected currently, the incidence of leprosy is expected to decline as standards of living are raised.

It is probable that modern therapy has only accentuated a pre-existing trend toward declining incidence in many of the chronic diesases. The corresponding increase in world population will pose an increasing strain on food supply and other social aspects.

MILTON CORN

Notes and Queries

Edited by Ralph H. Major, M.D.,* and Dorothy M. Schullian, Ph.D.**

John Dalton's Autopsy

It is not generally known that an autopsy examination of the eyes and brain of John Dalton, the chief protagonist of the atomic theory, was made and recorded. This is not only of interest to the historian of chemistry, since it is unique in the annals of that science, but to the historian of medicine as well, for the main purpose of the post-mortem study was to test the validity of Dalton's theory of color blindness, then popularly known as Daltonism. Dalton first noted a peculiarity in his color vision in 1790 while studying botany; he had great difficulty in accurately describing the colors of flowers. In 1792 he became convinced of his deficiency and found that he could see only three colors of the daylight spectrum, yellow, blue, and violet. The yellow corresponded to the red, orange, and green of normal vision. He also found his brother similarly affected. On 31 October 1794 he communicated his findings to the Manchester Literary Society in a paper entitled, "Extraordinary facts relating to the vision of colours,"[1] stating "that part of the image which others call red appears to me little more than a shade or defect of light; after that the orange, yellow and green seem one colour which descends pretty uniformly from an intense to a rare yellow, making what I should call different shades of yellow." On 27 November 1795 he read a second communication, "On the colour of the sky, and the relation between solar light and that derived from combustion" which was never published. Dalton found by experimentation that a sky-blue, transparent liquid changed transmitted candlelight to a color similar to daylight, and modified a pink color to a light blue when viewed through it. He concluded that his red and green defect was due to one of the humors of the eye which was so colored as to absorb red and green, but would transmit blue and other colors. Prior to his death, he asked that his eyes be examined to verify this contention.

Dalton died on 27 July 1844 at the age of seventy-eight from a cerebral vascular accident. Early in 1837 he had begun to have headaches but paid little attention to them until 18 April, when he had a "stroke" which left a paralysis of his right side and affected his speech. In a few weeks he recovered some use of his right side, but he never fully returned to normal speech and had some permanent impairment of his memory. He resumed work at the end of May, but had a similar attack in February 1838 from which he again recovered. On 20 May 1844 he had a third occurrence and suffered an

* Department of Internal Medicine, The University of Kansas School of Medicine.
** Rome, Italy.

1 *Mem. Lit. and Phil. Soc. of Manchester*, 1798, *5*, 28.

almost total loss of articulation. He finally succumbed on 27 July to a fatal attack and was found dead on the floor of his room.[2] The post-mortem examination was made on the following day by his physician Joseph A. Ransome with the assistance of a Mr. Bally in the presence of George Wilson, lecturer in chemistry at Edinburgh, and one who was very much interested in Dalton's theories of color blindness.[3] The following observations of Ransome were printed from a letter to William C. Henry in the latter's biography of Dalton,[4] the first full-length account to appear.

. . . We found the veins and sinus distended with blood, but there was no evidence of recent rupture of any, even the smallest, vessel. In general, the substance of the brain was firm, but in the anterior portion of the middle lobe on the left side, above the fissure of Silvius, we discovered a sac, firm and rather thick, containing the débris of an old coagulum, and softening of the brain around it. The arteries of the brain were all more or less brittle from earthy deposit, but we did not discover any aneurismal dilation.

The weight of the brain and membrane was about 3¼ lbs.

Mr. Bally (formerly assistant to the late Dr. Spurzheim) was present, and took casts of several parts of the brain, and the cavity of the skull. He pointed out a remarkable prominence on the frontal portion of the orbitar plates (which represents the phrenological site of the '*organ of colour*'), and the imperfect or deficient development of the convolution of the anterior lobes, which rested upon them. Of course, Mr. Bally adopted this as the true explanation of the peculiarity of Dalton's vision; and we as witnesses (not only without faith in 'phrenology,' but even opponents) are bound to record the fact.

The eyes, in situ, presented no peculiarity; the corneae had the usual semi-opaque arcus senilis round them, but no discoloration of the humours could be discovered then or subsequently. As their removal and careful examination were necessary to a scientific truth of some importance (with the consent and approbation of one of his executors then present), I removed them for the purpose of making a more careful examination of them at my leisure.

On examination, I sacrificed one to the determination of the colour of the three humours; the *aqueous* was collected in a watch-glass from a careful puncture of the cornea, and viewed both by reflected and transmitted light, was found to be perfectly pellucid and free from colour. The *vitreous humour and its envelope* (the hyaloid membrane) *were also perfectly colourless.* The *crystalline lens* was slightly amber-coloured, as usual in persons of advanced age. The tunics, choroid and sclerotic, with their subdivisions, presented no peculiarity.

In the other eye, the posterior part being removed by a vertical section in a plane at right angles with the axis, with as little disturbance as possible of the humours, we were able to see objects as through a lens, and thus ob-

[2] For full details on Dalton's medical history, see *Brit. quart. Rev.*, 1845, *1*, 157; this is the first account of Dalton and his work; although unsigned, it was written by George Wilson.

[3] Wilson was the author of *Researches on colour-blindness; with a supplement on the danger attending the present system of railway and marine coloured signals,* Edinburgh, 1855; a commentary by Wilson on Dalton's color blindness appears as an appendix to W. C. Henry's *Memoirs of the life and scientific researches of John Dalton,* London, 1854, pp. 239-249.

[4] W. C. Henry, *op. cit.*, pp. 201-203.

jects of different colours, both by transmitted and reflected light, were examined *without any appreciable difference.* I did not omit to place scarlet and green together, as I knew that the Doctor was unable to discover any difference between the colour of the scarlet geranium flower and its leaves; but to my eyes, the contrast of the colours seen through the medium of the greater portion of the humours was as great as ever. Sir David Brewster visited me shortly after this examination, and I endeavoured to keep the humours in a state for his inspection and experiment; but he suggested nothing further, as he agreed with me, that the imperfection of Dalton's vision arose from some deficient sensorial or perceptive power, rather than from any peculiarity of the eye itself.

One of the eyes described above, in a dry, shrivelled state, is preserved today with the Dalton Hall relics.[5]

DENIS I. DUVEEN
HERBERT S. KLICKSTEIN

*American Doctors in the Crimean War**

"A great drama is being displayed before us; its consequences will be reflected perhaps centuries hence."

Dr. N. I. Pirogoff

A hundred years ago the first party of American surgeons who had enrolled in Russian service arrived in besieged Sebastopol. They came from Paris where they had gone to study but, attracted by good pay offered by the Russian government and inspired by the pro-Russian opinion which prevailed then in America, they decided to test their knowledge and skill on the battlefield in Crimea. Most of them paid with their lives for this heroic decision; many of them remained forever under Russian crosses in the Crimean soil, while in their native land their letters and reports from Russia lay under the dust of archives like bundles of dried flowers. On the occasion of the centenary of the beginning of their selfless work during the defense of the famous Russian fortress, I shall try to weave a wreath from these "dried flowers" which I have found in the American archives.

The "traditional," and now forgotten, Russian-American friendship reached its apogee during the Crimean War. The reason for this was, as usual, the tension in relationships with a then common enemy, England, which country, planning the dismemberment of Russia, looked askance upon the "imperialism" of the U.S.A. and was disturbed by it. During the Crimean War, despite sharp protests from England and France, the American press was full of pro-Russian articles; there would appear in the American journals verses under such titles as "Sebastopol" in which "the British lion,

[5] E. M. Brockbank, *John Dalton, some unpublished letters of personal and scientific interest with additional information about his colour-vision & atomic theories,* Manchester, 1944, p. 47.

* From an article appearing in the Russian daily newspaper, *Novoye Russkoye Slovo,* Sunday, 17 Jan. 1954, Vol. XLIV, No. 15,240, page 2, which was brought to our attention by our co-editor, Dr. Lloyd G. Stevenson and kindly translated by Dr. Paul Yakovlev, Director, Psychiatric Training Faculty of Massachusetts, Inc., Boston, Massachusetts.

baring his teeth, the Gallic cock with clarion loud, and the Ottomite" were derided and "the unconquered spirit of the Russian czar" was extolled. The American shipowners were arriving in Petersburg with the offer to build in the Pacific a squadron under the Russian flag, and three hundred Kentuckian riflemen "were thirsting to try their marksmanship upon the enemies of the Russian czar in Crimea." This pleasure was, however, denied them lest the neutrality of the U.S.A. be too obviously breached.

Instead, thirty American physicians, having managed to reach Crimea through Odessa before it was blockaded, contributed their share of help during the siege of Sebastopol. At that time the duties of the American Consul in Odessa were carried out by John Ralli, a local merchant and a Russian subject of Greek origin of whom there were many in the south of Russia. The American merchant vessels began to come to Odessa in 1810 and so the establishment of an American Consulate in this important Russian port became absolutely necessary. In 1831 John Ralli, who spoke perfect English and who was in contact with America because of his business interests there, succeeded Charles Ring as the American Consul in Odessa and served in this post without compensation. During the Crimean War, Ralli rendered invaluable services, not only to the group of American physicians who came to Odessa on their way to Crimea but also to the other Americans who happened to be in Odessa on other business.

Independently of Thomas Seymour, the American Minister in Petersburg, Ralli was sending to Washington his own reports on the progress of war, on blockade, and on bombardments of Odessa and other ports of the Black Sea, forwarding to the U.S.A. also the detailed reports of the American physicians from the Crimean theater of war, fulfilling their private commissions, and attending to the personal and family matters of those who fell victims of epidemics in Crimea and in the south of Russia.

The first American surgeons, Drs. Courtney King from South Carolina and Draper from Massachusetts, arrived in Sebastopol in the summer of 1854 just at the beginning of military operations in Crimea and witnessed the first bombardments of Sebastopol by the enemy. King was soon transferred to Simpheropol, while a third American physician, Dr. Turnipseed, arrived in Sebastopol. Until the end of December the American physicians lived on the North Side but later, on special order of General Osten-Saken, an apartment with all conveniences was allocated to them in the house of the General in Sebastopol itself. They worked in the famous dressing station organized in the Club of Nobles "which in its taste and beauty is an ornament and credit to the city," they wrote to Washington. From the beginning of the siege of Sebastopol to mid-January of 1855 the Club of Nobles was used also for surgical operations. The operating room was set up in the billiard room; lint and bandages were laid on the billiard table; the parquet floor was covered with a crust of dried blood and in the dance hall there lay hundreds of amputees whose moans replaced recent music. Besides wounded soldiers there were brought to the dressing station also women and children

with limbs torn by cannon balls which fell in the Korabelny Settlement* where families of sailors lived. In his "Sebastopol Stories" L. N. Tolstoy describes thus the dance hall of the Club of Nobles after one of the bombardments:

> A large, high dark hall, lit only by four of five candles with which doctors examined the wounded, was literally filled. Stretcher bearers constantly brought in wounded, placed them side by side on the floor which was already so crowded that the unfortunates were pressed one against another and were drenched in each other's blood; then they went out to bring new ones. The pools of blood on the floor in places not yet filled, the feverish breathing of several hundred men and the perspiration of stretcher bearers produced a thick, foul stench amidst which four candles were burning in four corners of the hall.

Another participant of the siege of Sebastopol tells in his memoirs of physicians who worked in this main dressing station:

> Once I stepped into Schneider's Inn. Doctors of the main dressing station came here running in their short aprons of oilcloth covered with caked blood and pieces of dried flesh stuck to it; their hands coated in dried blood were shining as if gloved; they would hurriedly devour some chicken with these same hands and, licking bloody fingers, would again hurry to their horrible work.

In November 1854 the great Russian surgeon, N. I. Pirogoff, came to Sebastopol with a group of doctors and the first Russian nurses. This was the first organized women's auxiliary on the battlefield in Europe. In the following year nurses appeared also in the British army and later the Russian experience was used during the Civil War in the U.S.A. It is of interest to note that in the latter war one of the first American nurses on the battlefield was the wife of the Russian Colonel Tourchaninov, who emigrated to America after the Crimean War and served as general in the American Northern Army. Under the cannon fire of the terrible Crimean campaign the principles of military field surgery were developed and the scientific theory of military medicine was created by Pirogoff from practical experience. "I have noted," Pirogoff reminisced later, "that not only our own but also foreign physicians, German and American, who entered our service during the Crimean War were equally none too sure of the A B C's of surgery." It was for this reason that Pirogoff published his work *Principles of Battlefield Surgery* not only in Russian but also in foreign languages. Pirogoff's "Principles" were later used as a textbook by the Philadelphia medical students and the American Dr. Gewson applied in his operations the method of the famous Russian surgeon.

Early in December 1854 Pirogoff began to be concerned over the huge concentration of wounded in Crimea and by the disorganization of their evacuation for he feared epidemics. In one of his letters home Pirogoff wrote:

* Docks.

If one gives thought to the fact that in Sebastopol the English bury their dead only a yard deep, that the entrails of killed animals putrify in the open air all around, and that the carrion is scattered everywhere, and should in addition to all that hot weather come in the spring, then the whole region will be in danger of infection.

Pirogoff's forecasts were not slow to be fulfilled. At Christmas one of the Russian physicians died in Sebastopol from typhus and in Simpheropol eight nurses became ill with typhus. On January 13, 1855, Pirogoff wrote: "Nurses of the second echelon have arrived. The nurses of the first echelon were all taken ill, three died."

In the middle of January Dr. King came from Simpheropol to Sebastopol to visit his colleague, Turnipseed, who became ill with typhus. Turnipseed was the first among the American surgeons who became ill with typhus and one of the few who survived. King was soon transferred from Simpheropol to Kerch. The epidemic of typhus was flaring. In February four physicians and six nurses were taken ill with typhus in Sebastopol; in March two nurses died. On March 6th Pirogoff wrote: "I have warned that if measures are not taken the epidemic of typhus will come—and so it did."

Physicians and nurses constantly fell ill and naturally some died. On March 25th Pirogoff reports: "Almost half of all the physicians are down—sick. . . ." And in April he communicated: "All physicians have been ill. Many have died before my eyes; all had typhus. I was ill four weeks myself."

Typhus caught up with King in Kerch. He was the first victim among the American physicians. He died on March 19th and the next day in Sebastopol his friend, Draper, died also from typhus. King, a young and promising American doctor, died in Kerch alone, far away from home and family. The sick American was cared for by the Orthodox Community of the Russian Church. When he was being buried, the clergy of the church attended the funeral of the deceased in a body and so the American physician was presumably buried according to the Orthodox rites. The American Minister, Seymour, notified King's family in Charleston, South Carolina, of his death and forwarded to them an official letter of sympathy from the Russian government, while Ralli took upon himself the care of forwarding to the U.S.A. the papers and personal effects of the deceased. Usually the American physicians arriving in Odessa left part of their effects at Ralli's. King's belongings in Kerch perished during occupation of the town by the French and so only the effects left by him in Odessa were saved.

The Russian government paid the relatives of King and Draper in America the salary due the deceased men and in accordance with the request of Dr. Draper's brother, Henry Draper of Attleboro, Massachusetts, his body was transferred beyond the ocean to his native Massachusetts.

From March 28 to April 8, 1855, Sebastopol was subjected to constant bombardment and during this time surgeons had to perform up to five hundred amputations alone. In place of the fallen Draper another American

surgeon, Whitehead, wrote the reports from Sebastopol. With Whitehead several more young American surgeons had come to Sebastopol.

At the end of April reinforcements reached Sebastopol; around the town and in the fortress there were concentrated now more than 100,000 Russian troops.

On May 14th Pirogoff wrote that during two days and two nights there were 2,000 Russians wounded and 800 killed, while of the enemy there were twice that many. A few days later Whitehead informed Ralli that after the battle of May 26th the Russians lost 10,000 men in wounded and killed.

In May there began a heat wave in Crimea and with it the typhus was succeeded by the epidemic of cholera. MacMillan, a young American physician from Aberden, Mississippi, was taken ill with this dreadful disease in Sebastopol and died six hours later. The next victim of cholera was an American doctor, Charles Nickles, who served in Cherson. Later Drs. Denwood T. Jones from Maryland, Charles A. Deininger from Pennsylvania, Addison Marshall from California, and Henry Clark from New York died one after another in Simpheropol. In the same city the American physician, Stoddard, was taken ill with cholera but recovered and went to Berlin. Shortly after, colleagues of Stoddard in Simpheropol were struck with the unexpected news of his sudden death in Berlin.

One of the Russian participants in the Crimean campaign commented in his memoirs on foreign physicians in Russian service during the Crimean War thus:

> For want of knowledge of the language and of existing conditions, for unfamiliarity with the medical administration and means of our establishments and also for want of the understanding of attitudes and ways of life of our soldiers, they all could be tolerated only in base hospitals where it was easier to replace one physician by another or where the less experienced could work under guidance of the more experienced. As to the front line, if they happened to be assigned there, they would, having realized their shortcomings, soon ask for a transfer to hospitals.

This statement hardly applied to the physicians from America. They remained to the end under cannon balls and bullets at their stations in the besieged Sebastopol. The American surgeon, Henry Bostivick, served with distinction on the front line as surgeon of one of the Russian regiments of hussars to the end of the war. Dr. Wake Bryarly from Baltimore was decorated in Crimea with Russian military orders and remained in the Russian service after the war, serving in the south of Russia and in Bessarabia. The American physicians were present not only in Sebastopol, Simpheropol, and Kerch but also in Cherson, Nikolayev, and even in Khemenchug, where one of them, Dr. William Hart from Tennessee, died of smallpox.

More than half of these selfless young Americans gave their lives while serving under fire in Sebastopol as surgeons to the Russian wounded and fighting epidemics in the hospitals of southern Russia. One of the American diplomats in Petersburg relates in his memoirs how the American Minister,

Seymour, on having received each notification of the death of one of these brave young men would return from the Russian War Ministry with tears in his eyes.

The names of thirty American physicians who served under the rain of cannon balls and Stutzer* bullets in Crimea at the side of Pirogoff and his collaborators and spent sleepless nights among the cots of typhus patients in the Russian rear must not be forgotten. On this day, when throughout the world, and in different ways, the centenary of the dreadful ordeal of Russia in the Crimean War will be commemorated, we here in America will evoke with gratitude the memory of the American youths who fell in our native land, for our cause.

E. Dvoichenko-Markov

Smallpox at Cornwall, Connecticut, in May 1801

Mr. Thomas E. Marston, Curator of Classics at the Yale University Library, has drawn our attention to an interesting original manuscript in the Historical Collection at the Library in Cornwall, Connecticut, which outlines measures to be taken for the public health during a smallpox epidemic in the town in 1801.

Whereas the Small Pox hath broken out in the Town of Cornwall and Mr Ebenezer Jackson is now infected therewith and is Sick in a Small House belonging to Mr Noah Rogers, near to said Rogers dwelling House and cannot be removed without exposing his wife; and whereas Sundry Persons have been greatly exposed to take the Infection from said Jackson before it was known that he had it—In order therefore to prevent (as much as may be) the further Spreading of said Disease, it is ordered and directed by the Subscribers that all Persons who have been exposed to receive the Small Pox from said Jackson and have or may receive the same by Innoculation Shall have the Same in the house where said Jackson now lies, or in the dwelling House of Mr Noah Rogers and Jesse Hyatt, that no Nurses or Tenders shall go more than 15 Rods from the House where the infected Persons are—that no Person or Persons who are not Nurses or Tenders to the Sick shall come within 15 Rods of the infected House except Capt Noah Rogers who may come within four Rods and that no Person or Persons do or shall pass the infected House in the Road or Highway until it be thoroughly cleansed, it is ordered that a Fence be erected across the Highway at the Corner by the old School House and a Pole not less than ten Feet high to be Set up, on the Top of which shall be a white Cloth fastened not less than two Feet Square and that a Fence be erected across the Highway North of Mr Noah Roger's dwelling House Somewhere a little North of Said Roger's Cyder Press, with a Pole and Cloth erected as directed for the South Fence—That all Dogs and Cats that Shall or may be found within the Limits aforesaid Shall be killed—It is further ordered and directed that no Person or Persons who may have the Small Pox in either of the houses aforesaid Shall leave or depart from said Houses until they are thoroughly cleansed, and have a Certificate that they are so cleansed, from the Infection from under the Hands of Doctr

* Make of rifle in use by the besieging armies—first breach loaded rifle. The Russians still used flintlocks of 1812 (translator's note).

Joseph North Mess: Oliver Burnham and Elijah Steele Junr or any two of them—and all Persons are hereby enjoined and required Strictly to observe the foregoing Orders, Rules and Directions, on Penalty of the Law in Such Case made & provided

Judah Kellogg Justice of Peace
Edward Rogers "

Cornwall May 5th A D 1801

Indian Association of the History of Medicine

The Editor has received this communication from Dr. D. V. Subba Reddy, a Consulting Editor of the JOURNAL:

I am writing this letter primarily to bring to your notice and through you to the notice of the American Association of History of Medicine and the two journals, *Bulletin of History of Medicine* and *Journal of the History of Medicine,* the formation, working, aims, and programme of the Indian Association of History of Medicine, started in 1947 and revived again in 1953. I have sent copies of a brochure giving an account of this Association to you some weeks ago and I trust they have reached you safely. The Association has now been registered and some men in position and authority like Col. C. K. Lakshmanan, Director-General of Health Services, Government of India, Delhi, Dr. C. G. Pandit, Secretary of the Indian Council of Medical Research, Delhi, Major General Bhatia, Dr. K. V. Krishnan, Director of All India Institute of Hygiene, Calcutta, Dr. M. R. Guruswamy Mudaliar, formerly professor of Medicine, Madras Medical College, Madras and now Director of Indiginous Systems of Medicine, and Dr. A. L. Mudaliar, Vice-Chancellor, Madras University, have become members and are supporting our Association. Many prominent medical men associated with medical education in different centres in India have all given general support. The Government of India has also recognized our Association.

P. Kutumbiah, M.D., M.R.C.P., Professor of Medicine and Principal, Christian Medical College, Vellore, has been the President and is engaged on an intensive study of ancient Indian medicine (*Ayurveda*), Dr. A. Anantanarayana Iyer, Director of Institute of Anatomy has been the Vice-President and he is interested in anthropology and Indian culture. I am the founder-secretary and my endeavour has been to do the spade work in the collection of archealogical, epigraphical, sculptural, literary materials and relics, side by side with the cataloguing and salvaging of ancient, medieval, and modern medical manuscripts and books and unravelling and publishing source material for the average medical professor and amateur medical historians.

I hope that the American Association of which I am a corresponding member and the medical institutes of America will encourage and help the Indian Association of History of Medicine. Our Association requests you to convey to the 27th Annual Meeting of the American Association of History of Medicine, our fraternal greetings and the best wishes for a successful session.

Sir Frank Colyer, F.D.S., F.R.C.S., LL.D.
An Appreciation

Dental and medical historians everywhere have experienced an irreparable loss by the passing, in his eighty-eighth year, of Sir Frank Colyer,

who, for over fifty years, was the Honorary Curator of the Odontological Museum at Lincoln's Inn Fields, London. He was freely acknowledged as the greatest authority on early dental appliances. His work, *Old Instruments Used for Extracting Teeth,* published in 1952, was the outcome of a lifetime of research.

A kind, generous, sincere man, he was never averse to sharing his vast storehouse of knowledge with every interested collector. The writer knew him well and is therefore able to speak from personal experience.

J. MENZIES CAMPBELL, *D.D.S., F.I.C.D., F.R.S.E.*

International Scholars Forum

The problem of publication of scholarly books has become a source of acute concern to all American scholars because of high manufacturing costs. To assist with the problem, the International Scholars Forum has been formed and has entered into an agreement with the well-known publisher, Martinus Nijhoff of The Hague, through which American scholars are given the opportunity to submit manuscripts to the Forum for appraisal with a view to possible publication by Mr. Nijhoff who will, if he accepts a manuscript, make his own arrangements with the author.

The Advisory Board of the Forum consists of the following persons, all of whom are from California: J. Anton de Haas (Professor of International Relations at Claremont Men's College), Philip Munz (Director of Rancho Santa Ana Botanic Garden), William T. Jones (Professor of Philosophy, Pomona College), Edward Weismiller (Associate Professor of English, Pomona College), Frederick Hard (President of Scripps College), and David Davies (Librarian of the Honnold Library). Further information may be obtained from Mr. Davies at the Honnold Library, Claremont, California.

Chicago Society of Medical History

The recent elections of the Chicago Society of Medical History will be of interest to readers of the JOURNAL. The following are the new officers: *President*: Dr. Ilza Veith; *Secretary*: Dr. Leo M. Zimmerman; *Council*: Drs. Barry J. Anson, George H. Coleman, David J. Davis, Earle Gray, Miss Ella Salmonson, Mrs. Nell Snow Talbot, Dr. Lowell Snorf, and Drs. Zimmerman and Veith, *ex officio*. This group is representative of the University of Chicago, Northwestern University, University of Illinois, Chicago Medical School, Crerar Library, and the medical profession of Chicago.

Galen's "De usu partium"

The readers of the JOURNAL will be interested to learn that Mrs. Margaret T. May, an associate of Professor Howard Adelmann in the Department of Zoology at Cornell University, Ithaca, New York, is engaged in translating the complete text of Galen's *De usu partium* from the original Greek. At-

tention may at this time also be drawn to Dr. J. M. Forrester's partial rendering, also from the original Greek, of Galen's *Arteriis natura sanguis contineatur* ("An Experiment of Galen's Repeated," *Proc. Roy. Soc. Med.*, Section of the History of Medicine, 1954, *47*, 241-44).

Bibliography of the History of Science

Attention is directed to Dr. George Sarton's stimulating discourse, *La Bibliographie de l'Histoire des Sciences,* prepared at the request of M. Pierre Sergescu for the *Archives Internationales d'Histoire des Sciences* (1953, no. 25). Dr. Sarton writes with his usual verve about the importance of preparing bibliographies of this character and the importance of continuing the critical bibliography which he inaugurated some years ago in *Isis.* He points out that the new editor of *Isis,* Professor I. Bernard Cohen, has named a committee to study the reorganization of the critical bibliography under the chairmanship of Henry Guerlac of Cornell. The other members of the committee are: Dr. I. B. Cohen, Mr. Morris Leikind, Dr. Genevieve Miller, and Dr. Conway Zirkle. Dr. Sarton discusses methods of selection, classification, the problem of languages, and the importance of following chronological arrangement in fifty- or one-hundred-year intervals.

Professor Dr. Luís de Pina

The JOURNAL wishes to take this opportunity to acknowledge the receipt of an unusual group of papers bearing on medical history from Dr. Luís de Pina of Oporto. The French abridgment of Dr. de Pina's history of Portuguese medicine, *Histoire de la Médecine Portugaise,* is well known to all medical historians, but his enormous productivity in all branches of medical history is not so widely known, and we draw attention to the papers which he published in the year 1953 as an example of his varied interests:

Fragmentos históricos de pediatria Portuguesa. *Revista Portuguesa de Pediatria e Puericultura,* vol. 16.

Raízes da sabedoria popular médica. *Imprensa Medica.*

Alfoz das letras e da história Vimaranenses. *Revista de Guimaraes,* vol. 63.

O Prof. Artur Castiglioni. *Imprensa Médica.*

A botânica na poesia da Marquesa de Alorna. *"Studium Generale" do Centro de Estudos Humanísticos,* vol. 1, nos. 1 and 2.

The Reform Act of 1832 and After

In a private communication which he permits us to quote "either eponymously or anonymously," Sir Arthur Daley, the distinguished historian of the public health movement in Britain, writes as follows (10 February 1954):

. . . I have often told audiences that the two great causes in this country of extensions of public health and welfare work have been progressive extensions of the franchise starting with the reform of Parliament and of Local

Government following the Reform Act of 1832, and war. The Crimean War gave us Florence Nightingale and the nursing services; the South African wars, the school health service; World War I, the venereal disease scheme, the maternity and child welfare scheme, consolidation of anti-tuberculosis work, and the establishment of the Ministry of Health; World War II gave us the National Health Service.

In a later letter (5 March), he enlarged upon his above remarks:

Until 1832 Parliament was mainly in the hands of a small oligarchy of land owners and aristocrats, but under the Reform Act of 1832, "£10 householders" were given the vote, the Parliament for the first time was a real democratic body. In 1833 they passed the first Factory Act; in 1834, the Poor Law Amendment Act; in 1835, the Municipal Reform Act which, incidentally gave the municipal or local franchise to *all* ratepayers; and in 1836, the Births and Deaths Registration Act. The second Reform Act was passed in 1867 which enfranchised working men in the towns; in 1870 we had our first Education Act; in 1871, a Public Health Act which established the Local Government Board and the urban and rural sanitary authorities, and this was followed in 1875 by that great charter of public health, the Public Health Act, 1875. In 1884 agricultural workers were given the vote and four years later there were established the county councils; in 1889 they passed the first act for notification of infectious diseases and in 1890 the great Lunacy and Housing Acts. The next extension of the franchise was by the Representation of the People Act, 1918, which gave women the vote, and the final extension was 1928, which provided for adult suffrage for both sexes over the age of 21. Since 1918 there has been a progressive and rapid development (some, in fact, think too rapid) of health and welfare.

What better illustration could one have of the interaction between the history of medicine and the great social forces that have shaped modern society?

Zahalon and Lemon Juice for Scurvy

Dr. Joshua O. Leibowitz writes (14 March 1954): "It was kind of you to quote my modest 'discovery' in finding the treatment of scurvy by lemon juice mentioned in Zahalon's Otzar ha-Hayim (fol. 75 col. 2, recto), a passage which escaped the attention of previous students of this author (*J. Hist. Med.*, January 1954, p. 121). However, Zahalon does not expressly add that this is a new prescription; at any rate the passage is remarkable, though Zahalon seems not to have carried out properly controlled experiments to corroborate his advice. It is further worth noting that the author recommends also juices of ethrog (citron) and oranges, as well as a number of raw plants (indivo, borraccina, assenzio). He adds that all of them 'when dried are not so effective and when cooked they lose some of their power through the process of boiling.' It may be recalled that the earliest treatment of scurvy by Jacques Cartier (1545) was not citrus fruit but the leaves and bark of the tree Annedda. So borraccina (moss) was also mentioned by Zahalon."

Riunioni Medico-Chirurgiche Internazionali, Torino

The international medico surgical meetings held in Torino 29 May-6 June 1954 were dedicated to the memory of Leonardo Botallo (c. 1515-c. 1588), who was born at Asti in Piedmont and whose anatomical studies are especially familiar to readers of this JOURNAL. A medal struck in his honor was distributed at the meeting, and because of his long services in France at the courts of Charles IX and Henry III the commemorative address was given by the Frenchman, Prof. L. Baudouin. The history of medicine section assembled on the afterenoon of 29 May, under the presidency of Prof. A. Botto-Micca, for a masterful address by Prof. Antonio Cazzaniga entitled "Storia e storiografia medica." Dr. Cazzaniga is Professor of Legal Medicine at the University of Milan and a profound student of the history of medicine. Of particular importance is his work *La grande crisi della medicina italiana nel primo Ottocento* (Milano, Hoepli, 1951, 122 p.). Readers of this JOURNAL will be glad to know that the eminent historian of Leonardo, Dr. Elmer Belt, participated actively at the urological meetings and delivered there the inaugural address on recent advances in urology.

The Gest Oriental Library at Princeton University

Doctor Hu Shih, former Chinese Ambassador to the United States, and one of China's most distinguished scholars, is now Honorary Curator of the Gest Oriental Library at Princeton University. He has recently published an interesting account of this important library (*The Princeton University Library Chronicle,* 1954, *15,* 113-141). The library was established by Guion Moore Gest (1864-1948), with the aid of Commander I. V. Gillis, former Naval Attaché at the United States Legation in Peking, who became Mr. Gest's adviser and agent.

It was apparently Mr. Gest's eye trouble that first aroused his interest in Chinese books. Suffering from glaucoma, Mr. Gest was advised by Commander Gillis to try an ancient Chinese eye remedy. This gave some temporary relief, without cure, and so interested Mr. Gest that he left money to enable Mr. Gillis to buy Chinese books on medicine and especially on diseases of the eye. Accordingly, the Gest collection is particularly rich in Chinese medicine and comprises "some 500 works in nearly 2,000 volumes and constitutes the largest collection of Chinese medical books outside of China and Japan."

The books were first housed in Montreal, but in 1937, with the assistance of the Rockefeller Foundation, The Institute for Advanced Study at Princeton acquired the Gest Collection with the understanding that it was to be administered as a part of the University Library. It then totaled approximately 102,000 volumes. With the University additions and recent acquisitions, it totaled 137,087 volumes in June, 1953.

Those who have examined the Collection find that as much as 70 per cent of the volumes are not duplicated elsewhere. It includes four of the five

sets of the original "Imperial Palace Movable Type Reprint Series," the fifth set being in the Imperial Palace in Peking. It includes about 700 volumes of books printed from wood blocks cut in the years A.D. 1232-1272 (Sung Dynasty editions) and about 1,700 volumes of books printed from wood blocks cut in the years 1297-1322 (Yuan Dynasty editions). In addition there are over 2,000 manuscripts copied before 1600. It includes 5,020 volumes of the complete set of the 1728 edition of the Imperial Encyclopedia in movable copper type.

It is apparent that the Gest Oriental Library at Princeton University is a treasure of great value for research in the cultural history of an extraordinarily brilliant and fertile people. Scholars in this country will long respect the memory of Mr. Gest in furnishing the means to assemble this great collection, and of Commander Gillis for his knowledge and skill in selecting and obtaining the extraordinary riches here preserved.

CHAUNCEY LEAKE

Book Reviews

ERWIN H. ACKERKNECHT. *Rudolf Virchow. Doctor. Statesman. Anthropologist.* Madison, Wis., The University of Wisconsin Press, 1953. xv, 304 pp. $5.00.

Reviewed by AVERILL A. LIEBOW, *Professor of Pathology, Yale University School of Medicine.*

ONLY a man with a wide and deep knowledge of medicine, anthropology, and politics alike, could write a full biography of the genius Virchow. Such a rare biographer is Erwin Ackerknecht who, as chance would have it, was born in Virchow's home province. Nor does the coincidence end here; for they share a passionate interest in the history of medicine.

This book deals largely with the ideas of its subject. Even the introductory chapter tells little of Virchow's personal characteristics or of his life, except as a man of science and of politics. But as such, Virchow is drawn in sharp detail against the intricate tapestry of the times. Dr. Ackerknecht's scholarship is reflected in the many figures that he has woven into this tapestry. They are gathered together in a biographical glossary, a remarkable *dramatis personae* indeed. Numerous annotations carry the reader to the original sources or collateral works.

Skillfully accomplished is the difficult task of making clear the state of pathology, and indeed of the theory and practice of medicine, at the time of Virchow's entry upon the scene. It is difficult to imagine a man of twenty-six, hardly four years beyond his doctorate, challenging established authority, and founding a scientific journal that Osler, some forty years later, called the greatest existing repository of medical facts. Ackerknecht, with Welch, stresses Virchow's recognition of pathological physiology as the basis of scientific medicine. This is indicated even in the title of his great journal, *Archiv für pathologische Anatomie und Physiologie und für klinische Medizin*. It is most unjust to consider Virchow, as many have done, simply as an anatomist. His first interests were chemical, and much of his early work was experimental, as for example his study of the effects of occlusion of the pulmonary artery in dogs. The leading articles in the first eight volumes of the *Archiv*, by Virchow himself, set forth these principles in great detail. Here appears the dictum "omnis cellula a cellula" that founded a school which still flourishes despite new emphasis on "humors" (now more precisely defined), and even molecular dynamics and architectonics. His *Cellularpathologie*, first published in 1858, elaborated his concepts and gave them substance. By far the largest section in the biography is devoted to the development of these ideas and to the great discoveries, for example, of the rôle of leukocytes in exudation as distinguished from leukemia. Only occasionally is there perhaps superfluous presentation of details of minor contributions and

of theories that have not stood the test of time. But even this may be useful in that it serves to correct any naïve impression of infallibility on the part of the subject. Surprising is Virchow's early skepticism of the discoveries of the bacteriologists and of Darwinism.

Virchow soon found himself sharing with Neumann the idea that medicine is a social science. At the very beginning of his career Virchow was asked to make a study of an epidemic of typhus fever—and he was forced to lay the blame for the epidemic on the government of Silesia for creating the poverty and dirt that he considered to be the causative factors. His social conscience even led him to the barricades during the unsuccessful revolution of 1848—an episode that almost cost him his academic head. But upon the insistence of various medical groups who had already recognized his brilliance, there was a resurgence in his fortunes and in less than ten years he was called from Würzburg to the professorship at Berlin. Here public affairs increasingly occupied his attention. He served not only as an alderman in Berlin, but also in the lower house of the German Parliament. The tale of these activities forms one of the most interesting parts of this biography. Virchow, as a staunch liberal, continuously opposed the able but ruthless Bismarck, who at one time even threatened a duel on a point of honor. In the peculiar half light of more recent times, he was temporarily canonized in the Russian zone of Germany, but fell into limbo when his expressed distaste for Communism was publicized by the opposition.

Dr. Ackerknecht is especially well qualified to appraise his stature as an anthropologist. Here, too, Virchow was not a dilettante, but a specialist of the first rank. He moreover somehow found the time to indulge an interest in archeology, not merely in a friendship with Schliemann, the remarkable author of *Ilios,* but in actually assisting him in the excavation of the presumed site of ancient Troy at Hissarlik. It was his influence that prompted the misunderstood and disaffected Schliemann to bring these priceless relics of ancient Greece to Germany.

This short book tells factually and well the story of a genius who lived, perhaps more than anyone in his century, the dictum, "the proper study of mankind is man."

ROLAND H. BAINTON. *Hunted Heretic. The Life and Death of Michael Servetus 1511-1553.* Boston, The Beacon Press [1953]. xii, 270 pp. $3.75.

Reviewed by C. D. O'MALLEY, *Department of History, Stanford University, California.*

IN the introduction to the present volume Professor Bainton informs the reader that his interest in Servetus as the subject of a biographical study dates back to the year 1926. Thereafter, as students of the subject are aware, this interest was first displayed in a paper on "The Smaller Circulation: Servetus and Colombo" (1931) and then in a bibliography of the literature of Servetus, "The Present State of Servetus Studies" (1932) which in its

thoroughness gave promise of a future biography to be based on an exhaustive study of the sources. Occasionally the result of such a long-term project is disappointing, but it is a pleasure to state that such is not the case in this particular instance.

Hunted Heretic presents the life, thought, and activities, and finally the trial and execution of Servetus with the sure and thoughtful control of the evidence that students of the Reformation have come to recognize as characteristic of Professor Bainton's studies. The contents of the book represent the Tipple lectures delivered by the author at the Divinity School of Drew University in 1952, and it may be partly for this reason that the story is told topically, a method of presentation which has both good and bad aspects. By means of such presentation the author is permitted to dwell at length upon certain matters such as the influences and the course of development of Servetus' ideas as they finally emerge from his writings. It is a method of considerable value, for instance, in regard to the development of Servetus' ideas on the Trinity as presented by him in 1531 and 1532. On the other hand, it creates some difficulty for one attempting to follow the career of Servetus chronologically and especially in respect to the interaction of theological and non-theological interests in that career.

To the readers of this journal Servetus is probably remembered first of all for his description of the transit of the blood through the lungs, the so-called lesser circulation, and Professor Bainton devotes two chapters to this and to the other scientific and medical aspects of Servetus' career. Scientific and medical activities began with the editorial work on an edition of Ptolemy's Geography published in 1535 in which novel and caustic comments upon national characters were introduced, an effort was made to give Columbus his proper due, and doubts were expressed about the value of the royal touch in the cure of scrofula. It is noteworthy that Professor Bainton is far more restrained in his praise of Servetus' contributions to geography than previous biographers. The first indications of an interest in medicine are to be found in a little tract defending Symphorien Champier against Leonard Fuchs (1536) of which Professor Bainton remarks with, it is to be feared, some relish, "for sheer triviality [it] may give comfort to theologians when reproached with a contentious spirit by men of science."

The following year witnessed the publication of the little book on syrups, a work of some success as indicated by its six editions. While the book is ably characterized, it is not quite clear why Professor Bainton should single out its mention of the dietary value of citrus fruits as "an unwitting anticipation of vitamins" since the inclusion of such fruits in dietary instructions was fairly common at the time. It was during this period that Servetus was enrolled in the medical school of the University of Paris, although it is doubtful that "his colleague in dissection was the great Vesalius" since Vesalius left Paris in 1536. Finally, Servetus became involved in a quarrel regarding astrological prognostication, published his apology for astrology, was censured by the university authorities, and left Paris, whether with or without

a degree we cannot be sure. Professor Bainton takes no definite stand on this matter although he appears to lean more to the belief that the degree had actually been granted.

The final and most important medical contribution of Servetus was, of course, his description of the lesser circulation based, according to Professor Bainton, on Galenical sources and dissection. "His first correction of Galen was the direct result of dissection" writes the author presumably basing his statement—which is probably correct—solely on assumption since there is no actual evidence of dissection by Servetus for this purpose. The further possibility of the influence of Vesalian doubts regarding the permeability of the septum are not taken into consideration, but, on the other hand, Professor Bainton does stress—and it seems rightly so—the curious rôle of theology in the promotion of this physiological discovery. Continuing, Professor Bainton refers to a statement of Symphorien Champier, "the blood is a traveler," and remarks, "How easily this idea might have led to the discovery of the full circulation! So far Servetus was not in a position to go. He did, however, follow the blood to the brain; there the soul in the blood, he assumed, vivifies all the faculties of the body, since the soul animates the body, as in turn it is animated by God." Although Professor Bainton does not say so, yet it appears to the reviewer that the theological belief of Servetus which underlay his description required a full circulation. Nowhere does he give such a description, and most likely he would have been unable to do so, yet it would be unjust to deny to him at least a possible assumption of the full circulation.

In his own day and for many persons at present Servetus' major significance lies in the field of theology. His first and his last interests were theological, and it was because of theology that he was executed, while, as has been mentioned, the description of the lesser circulation, tucked away in a theological treatise, was presented to serve those ends. Therefore the bulk of the book is a biography of Servetus the theologian, and only two chapters, as has been said, are concerned primarily with his relationship to medicine and science. Nevertheless the entire life of Servetus and the development of his theological views make a story of very considerable interest and, as Professor Bainton tells it, excitement no matter what the reader's major concern may be. Furthermore, the facts as we know them directly from Servetus and his contemporaries are relatively meagre with the result that of necessity there had to be much patient assemblage of bits and pieces of evidence and occasionally a deduction which seemed most likely. Since, moreover, most of the career of Servetus is that of a man hiding from the authorities under an assumed name, the assemblage of evidence and the presentation of the life and activities of Servetus virtually represent a tale of detection well and ably told.

In the life and horrible fate of Servetus we have a particularly dramatic episode in the long struggle between tolerance and intolerance which gave rise, almost immediately after the execution of Servetus, to a considerable

body of literature in advocacy of liberty of opinion and which was to have no little influence for the future, although, as we all know, the battle has never been finally won. When earlier in this century the Calvinist Church of Geneva erected an expiatory monument to Servetus and termed his execution "an error of the times" the outlook for tolerance of opinion was far more optimistic than more recent events have indicated, and the wide ramifications of contemporary repressive authoritarianism make the life and death of Servetus a story which bears a message for all readers today. Professor Bainton is to be heartily congratulated for this study which has been awaited so long and impatiently.

MICHAEL SERVETUS, *A Translation of his Geographical, Medical and Astrological Writings with Introductions and Notes* by Charles D. O'Malley. Philadelphia, American Philosophical Society, 1953. 208 pp. $3.00.

Reviewed by ROLAND H. BAINTON, *Titus Street Professor of Ecclesiastical History, Yale University.*

THIS translation of the passages in the works of Servetus relevant to the history of science is very welcome, doubly because the Latin of Servetus is so full of technical terminology that only a specialist is in a position to find the appropriate equivalents. Professor O'Malley has shown fine craftsmanship in the execution of this arduous task.

The introductions are accurate, adequate, but minimal. There is no comprehensive attempt to place each work in the cadre of Renaissance science. The biography of Servetus is naturally brief because there are fuller treatments to which reference is made. A short account is given of those editions of the *Ptolemy* which Servetus was engaged in revising. His own editions of 1513 and 1541 are compared on two points, but there is no systematic account of the variations. The introduction to the Fuchs-Champier controversy is fuller. The account of the doctrine of the syrups is illuminating. The story of the trial for astrology at Paris is taken from documents published by Tollin and referred to by O'Malley in his article "The Complementary Careers of Michael Servetus: Theologian and Physician," reprinted from the *Journal of the History of Medicine and Allied Sciences* (1953, *8*, 378-389). The reference to Tollin is for some reason omitted in the book.

The previous debates on the moot points with regard to the passage of the pulmonary circuit of the blood are not reviewed. O'Malley makes the point that Servetus had had little experience in dissection, and that he went only slightly beyond Galen. The advance, such as it was, is attributed to theological considerations.

But why theology need have figured is not made plain. If, as O'Malley says, there are but two possible routes for the blood, either through the septum or through the lungs so that if the one is closed the other becomes necessary, and inasmuch as Servetus said that scarcely more than a drop can

seep through the septum, one would assume that on physiological grounds he could not have done other than posit the pulmonary transit. This is not to deny the rôle of theology; the question is whether it reinforced or displaced physiological considerations. Moreover, one item has been overlooked, as to the activity of Servetus in dissection. Dean Tagault recorded that when he went to remonstrate with Servetus over his addiction to astrology, he discovered him in the act of dissection. This point appears in the documents published by Tollin and referred to above.

A few minor matters call for comment. Calvin did not disobey the law in prosecuting Servetus. The law under which he suffered was the Roman law, the *Codex Justinianus* which prescribes the death penalty for the repetition of baptism and the denial of the doctrine of the Trinity. Servetus did not rake together all the works of Calvin he could to send them to him. On the contrary, Calvin sent Servetus a copy of the *Institutes*. Servetus marked it up and returned it. See the article by Nathanaël Weiss, "Calvin, Servet, G. De Trie et le Tribunal de Vienne," (*Bulletin de la Société de l'Histoire du Protestantisme français*, 1908, *57*, 400, n. 1).

Erasmus was no longer living in Basel when Servetus arrived. Therefore, Servetus must either have gone to Freiburg or have approached him through correspondence.

The point is very well made that Vesalius can scarcely have studied at Paris under Guinther at the same time as Servetus.

Note that Alexander Gordon translated the circulation passage and took account of all the variants in the Paris manuscript in his study "Miguel Serveto-y-Reves" (*Theological Review*, 1878, *15*, 281-307, 408-43).

These points are all very minor and the intent in mentioning them is not to detract from the value of a workmanlike performance of great utility.

S. VAN DER WOUDE. *Verguisd Geloof*. Delft, W. Gaade N.V. [1954]. 224 pp. Dutch f. 4.75.

Reviewed by JOHN F. FULTON, *Editor of this Journal.*

THIS well-illustrated and well-printed volume is described by Professor Roland H. Bainton as "a competent piece of popularization" which will undoubtedly do much to add to the knowledge of Servetus and Castellio among Dutch-speaking peoples.

A. C. CROMBIE. *Augustine to Galileo: The History of Science A.D. 400-1650*. London, Educational Falcon Books, 1952; Cambridge, Harvard University Press, 1953. xv, 436 pp., illus. 42s. and $8.00.

Reviewed by DOROTHY STIMSON, *Professor of History, Goucher College, Baltimore, Maryland.*

THIS book is an authoritative exposition of a little-known period in the history of science, seldom discussed and usually slighted by historians of science.

Dr. Crombie, having studied zoology in his native Australia, on coming to England studied philosophy. After lecturing in London at University College on the History and Philosophy of Science, he was recently appointed Senior Lecturer in the History of Science at Oxford University. During 1953-54 he is a visiting professor at the University of Washington. His acceptance into the Roman Catholic Church a few years ago is also a factor in his background as it affects his study of the Middle Ages.

In his brief introduction Dr. Crombie states his thesis, that systems of scientific thought have evolved not always because fresh facts have been discovered but because men have looked at long familiar evidence in a new way. "The chief problems before a historian of science are, therefore: What questions about the natural world were men asking at any particular time? What answers were they able to give? And why did these answers cease to satisfy human curiosity?" Gains are made far more from shifts in the questions than in the collection of new evidence. In the first chapter he has closely related his study to the scientific thought of preceding ages in a masterly way that leads into a coherent logical analysis of the period between the time of Augustine and that of Galileo when modern science was under way. This medieval period, according to him, by bringing about the marriage of technological development with the rationalization of philosophy, aided by mathematics, results in the birth of a new conscious empirical science seeking a rational structure for the natural world. Seventeenth century science, with roots reaching far back into the thirteenth and especially the fourteenth centuries, is thus the fruit of the systematic use of the new method of experiment and mathematical abstraction which Galileo exemplifies.

In three chapters an impressive array of documentary evidence is presented dealing with Systems of Scientific Thought, Technics and Sciencē, and the Criticism of Aristotle in the various centuries. Of particular value is the chapter relating the important but largely anonymous technological advances to the science of the age. Here Dr. Crombie has brought together much recently uncovered material in a fresh correlation not elsewhere available in English. Considerable attention throughout is also paid to the history of medicine along with the mathematical and physical sciences. That the progress of medicine also reflects the philosophy and the scientific theories of an age is a fact usually ignored or slighted even by writers of general histories of science. Indeed, three of the sectioned bibliographies accompanying each chapter specifically deal with "Medicine" while the index under Medicine lists references from the introduction to almost the last page. Harvey had many forerunners.

To an historian a comparison of this book with Dr. Butterfield's lectures on *The Origins of Modern Science,* 1300-1800 (Macmillan, 1952) is obvious. Both books cover almost the same period and both have much the same thesis—progress arises through a fresh look at the evidence which results in the formulation of new conceptual relationships. Butterfield presents his evidence in its historical and cultural context as interpretations or illustra-

tions of the scientific movements he discusses. Crombie, on the other hand, hews to the line of his thesis, amassing his evidence in support, while reserving for his large and careful bibliographies such headings as Philosophy and Scientific Method, The Literary Renaissance of the Fifteenth Century, Scientific Thought in a New Social Setting. But in his text these relationships are so firmly subordinated that the history of science he presents seems almost to have developed in an historical vacuum. It is to be hoped that his readers will be tempted to explore those bibliographies and fit together for themselves the settings that he has had to minimize.

In actual fact, Dr. Crombie's book is in the nature of a one-volume cyclopedia, a most valuable reference work, with a clearly stated and easily followed organization supported by convenient and succinct summaries. Unlike Butterfield's lectures, it is not intended for the general reader but for those with some familiarity with the field. For historians of any science, as well as of science in general, it is a mine of information.[1] All teachers and students of these fields now have at their elbows an indispensable study of a most significant period in the growth of science.

AUGUSTO D'ESAGUY. *Jacob de Castro Sarmento. Notas relativas à sua vida e à sua obra.* Lisbon, Edições Atica, 1946. 119 pp., illus., ports., facsims.

Reviewed by NILSON REZENDE, *Cultural Attaché in Medicine, Brazilian Embassy, Washington, D.C.*

THE erudite historian of Portuguese medicine, Dr. Augusto d'Esaguy, has brought us in this book a well-defined portrait of the Portuguese physician, Jacob de Castro Sarmento, born in the city of Bragança, Portugal, in 1691.

A descendent of Portuguese Jews of modest means, de Castro Sarmento was born at the time when the Inquisition was forcing the Jews and the so-called "New Christians" to leave the country, in spite of the fact that until the middle of the second dynasty Portugal was considered a modern capital of Israel. Indeed, the Jews enjoyed such freedom and distinction that many of them were able to influence the nobility and even the Crown itself. This was made possible because, as we are told by the author, Jews were the best scholars, astrologers, physicists, mathematicians, physicians, traders, and liberal thinkers. Principally, however, the Jews excelled in medicine, so much so that when they were exiled by the Inquisition, many of them became a type of honorary ambassador of Portuguese scientific development throughout the rest of Europe.

With the expulsion of the Jews from Portugal, the medical tradition of the country was greatly changed, since the doctors of Jewish descent were its main support and the best medical teachers in such universities as Coimbra, Évora, and also Salamanca in Spain. Some of the more important were

[1] For a technical discussion of Dr. Crombie's book and the validity of his evidence, see the review (*Isis*, 1953, *44*, 398-403) by Dr. Marshall Clagett, a medieval scholar also.

Manuel Brudo, who traveled in England; Garcia Lopes, who taught at Salamanca; Tomás da Veiga, natural scientist at Évora; and Rodrigo de Castro, who studied at Salamanca and was one of the first gynecologists in Europe. Indeed, the medical profession in Portugal was so distinctly Jewish that the author, quoting another historian, says that there were in the country ten doctors of Jewish blood to one pure-blooded Lusitanian.

As a student of Aristotelian philosophy, Sarmento was graduated from the University of Évora. A short time afterwards (1717) he received a degree of medicine from the University of Coimbra. But it was not long after this that he was exiled from Portugal. Although the reason for his exile has not been ascertained, it is generally conceded that it was because he openly practised his Jewish Orthodoxy. He went to London in 1720 or 1721 and, as a man of great culture, was well received. While he was in London, King John V of Portugal, in connection with educational reforms, authorized him to translate the works of Bacon. Unfortunately, due to the pressure of the Jesuits in Portugal, they were not accepted.

De Castro Sarmento studied experimental philosophy, chemistry, and analytical and anatomical physiology. Although he and many Jewish physicians exiled from Portugal found life in London comfortable and rewarding, he was nevertheless much disturbed by the treatment of the Jews in Portugal and always had them in mind. He became a close friend of the Marquis of Pombal, who was then Portuguese ambassador to the Court of St. James. Pombal eagerly sought his advice on many affairs, especially regarding pedagogical reforms for Coimbra, since Sarmento always had the interest of the scientific development in Portugal at heart. Incidentally, it was Pombal who, when he became Prime Minister of Portugal, decreed the expulsion of the Jesuits from the country and its colonies, where they had been the powerful factor in instigating the Inquisition.

Much of Dr. Sarmento's time was spent in the famous London clinics and hospitals. In 1738 he was made Fellow of the Royal Society of Physicians and became a member of the Faculty at the University of Aberdeen. Among his outstanding contributions to medicine were the first scientific studies of malaria in Portugal and the analysis of the Portuguese thermal water of Caldas da Rainha and other sources and indication of their uses. With another exiled physician, Dr. Fernando Mendes, he developed in his clinic an infusion of the "Quina-Quina" plant which was the forerunner of Quinine Sulphate. This remedy, called "Água de Inglaterra," was so miraculous that King Dom Pedro did not want the formula made public.

In 1721 Sarmento published his first treatise on the inoculation of the smallpox virus. This was accepted by the medical profession in Saxony, Sweden, and Russia. In 1735 he published the first half of his *Materia Medica.* This work was the first systematic study of pharmacology in Portugal. The second part of the book was published twenty years later. Included in the first volume was an historical preface on the history of medicine from

the Greeks and Arabs up to his time with especial emphasis on scientific and medical progress in Portugal.

One of the notable contributions to his beloved Portugal was his idea for a botanical garden at the University of Coimbra, for, as he said, "it was most necessary to the study of natural philosophy and medicine." Every kind of seed and plant cultivated in England was put at his disposal by the Royal Society of Physicians. Coimbra would not accept the idea, however, while the doctor was alive, saying that "the function of the Academy was not to interest itself in natural sciences but human ones." It was only after Sarmento's death that the Botanical Garden became a reality at Coimbra. The first microscope at the University was a gift from Dr. Sarmento.

This volume by Dr. d'Esaguy about the Jewish Portuguese physician who preferred exile to the abandonment of his religious beliefs is interesting and well documented and gives the reader a good idea of the history and progress of medicine in Portugal at that time. By practising the experimental method of Bacon, whose works he translated into Portuguese, Sarmento never ceased working for the advancement of the science which he had embraced as a career. He died at the age of seventy and is buried in the old Jewish Cemetery in London.

U. S. Army. North African-Mediterranean Theater of Operations. *The Physiologic Effects of Wounds.* Henry K. Beecher, Ed. Washington, U.S. Surgeon General's Office, 1952. xi, 376 pp., illus. $3.50.

Reviewed by Frank B. Berry *of the Office of the Assistant Secretary of Defense, Washington, D. C.*

It is a great pity that this volume was delayed so long in publication. The Introduction alone, written by E. D. Churchill, would have been of enormous value to all the younger doctors entering the Korean War, to say nothing of the body of the book. Dr. Churchill summarizes the knowledge about shock in the period from 1917 to 1942 and describes the management of the severely wounded in World War II in the Mediterranean Theater, dividing the evolution of this experience into three phases. The North African Campaign represented the first phase and was the testing ground for the recognition of the problems at hand and their immediate solutions; the most important of these was that plasma alone is not a substitute for whole blood—strangely enough the false belief of the medical profession at the outset of World War II. The second phase he calls the "Development of Resuscitation" which, under the guidance of Lieutenant Colonel Henry K. Beecher and others, reached a high state of efficiency. The third phase was the "Documentation by Scientific Evidence": namely, the appointment of a board to study the treatment of the severely wounded. The book is the report of their studies.

The writers approach the subject with open minds and narrate in detail their extensive studies on the wounded man from the time of wounding

through surgery and early convalescence. The degree of shock is measured by certain criteria they had established, and the relationship of shock to the type of wound, to blood loss, to blood pressure, and to biochemical changes in the individual is described. They clearly demonstrate the direct relationship between wound shock and blood loss. Their further observations include studies on liver and renal function and certain electrolyte changes in the wounded. Lower nephron nephrosis ("shock kidney") is taken up in considerable detail and the pathology of it carefully reported and beautifully illustrated; the lack of therapy and the various experiments in treatment are described. There is also a chapter on the "crush syndrome," including its pathology. The general pathology of traumatic shock is considered in detail later and is well illustrated.

The book provides the student with a large amount of information, many illustrations, both scientific and historical, and four appendices: Appendix A, The order establishing the Board with its personnel and equipment; Appendix B, A description of the field laboratory; Appendix C, A detailed description of the laboratory methods used; Appendix D, A survey of the case records.

This is perhaps the first comprehensive and mature study of the physiological effects of wounds and, based on these foundations, the present similar Army Commission projected its observations still further in Korea.

It is to be hoped that all who are interested in this problem will read and ponder the material so well correlated and narrated in this book.

BERNHARD MILT. *Franz Anton Mesmer und seine Beziehungen zur Schweiz. Magie und Heilkunde zu Lavaters Zeit.* (Mitteilungen der Antiquarischen Gesellschaft in Zürich, Band 38, Heft 1.) Zürich, Druck Leemann A Co., 1953. iii, 139 pp. Sw. fr. 7.

Reviewed by GEORGE ROSEN, *Professor and Head of the Department of Public Health Education, Columbia University, New York, New York.*

IN 1794, Franz Anton Mesmer acquired citizenship in Thurgau, and several years afterwards in a letter to the Helvetian minister Ph.-A. Stapfer he described himself as *citoyen suisse.* Later, Mesmer settled at Frauenfeld in Switzerland where he lived until 1814, a few months before his death. Throughout his checkered career he had numerous other contacts with Switzerland and Swiss medicine. The relations between Mesmer, his doctrine of animal magnetism, and Swiss medicine are the subject of Dr. Milt's monograph. This work contributes not only to a better understanding of Mesmer and his work, but is an equally significant contribution to the history of Swiss medicine.

On the basis of contemporary documents, letters, journalistic reports, and medical publications the author traces the various contacts between Mesmer and Switzerland. He deals first with the initial reception of the

doctrine of animal magnetism and traces its fate up to the outbreak of the French Revolution. A separate section considers the history of somnambulism in Switzerland. Succeeding chapters deal with Mesmer's visit of 1787 to Switzerland, his final settlement in Thurgau, and the effect of his doctrine on Swiss medicine. Mesmerism and somnambulism enjoyed only a short period of popularity among Swiss physicians. They soon rejected Mesmer's doctrine and its manifestations, and Dr. Milt shows the relation between this stand and the creation of the Helvetische Gesellschaft korrespondierender Ärzte und Wundärzte in 1788 by J. H. Rahn of Zürich.

No one interested in the history of medical hypnosis can afford to overlook this monograph. Many documentary materials are contained in it and add to its value.

HECTOR J. ROSSELLO. *Cátedra de Cultura Médica.* Facultad de Medicina de Montevideo, 1953. 254 pp.

Reviewed by J. PI-SUNYER, *of Winthrop Products, Inc., New York, New York.*

THIS is a very unconventional volume published in honor of Dr. Hector Rossello who was professor of Therapeutics for many years in the Medical School of Montevideo, Uruguay, and recently was appointed Professor of the History of Medicine. The present book is comprised of six lectures that were given by him in 1951 and five presented in 1952; some of them are published in their entirety, while of others there are only very brief, preliminary drafts. Each lecture has its own pagination; consequently, the book has no index of subjects or names.

The discourses cover a very wide field: Greek, Roman, and Islamic medicine, the anatomical and physical work of Leonardo da Vinci, music and medicine, the physician in the French Revolution, etc. This reader has a particular preference for the study of musician-physicians, which is centered upon three men: Jacob Henle, a very important anatomist who was not a very esteemed musician; Fritz Kreisler, a prominent violinist who never practised medicine, despite his degree; and Alexander Borodin, very distinguished both as a Professor of Medicine in Moscow and as a composer, besides being a well-known chemist, and a co-worker of Mendelieff. The lectures on Leonardo da Vinci and on the French Revolution are also very interesting and rich in information.

Altogether the book is a valuable contribution; it is unfortunate that the editorial designing by the Facultad de Medicina was so careless and the paper used of such poor quality. After his outstanding and long career as a teacher, Dr. Hector Rossello, on the occasion of his retirement, certainly deserves a more attractive book.

MIRKO DRAZEN GRMEK. *Santorio Santorio. Istarski Lijecnik.* Zagreb, Yugoslavenska Akademija Znanosti i Umjetnosti, 1952. 84 pp., 13 plates.

Reviewed by JOHN F. FULTON, *Editor of this Journal.*

THIS monograph, written in Croatian, has a detailed summary in English under the title, "The Istrian Physician, Santorio Santorio, His Apparatuses and Instruments." The monograph is divided into four parts: (1) Santorio's life, his work, and place in history; (2) his apparatus and instruments; (3) selected extracts from his writings; and (4) a bibliography. An Italian Istrian by birth, Santorio has always been an obscure figure who is best known in the history of medicine for his *De statica medicina* in which he attempted to elucidate in mathematical and physical terms the problems of insensible perspiration and other physiological functions. To demonstrate that through mere respiration (insensible perspiration) the weight of his body became lighter and lighter, he devised a steelyard on which he himself could sit. This was the beginning of quantitative studies of metabolism, and Professor Grmek quite rightly refers to Santorio as "the intellectual initiator of modern experimental medicine, i.e., of systematic applications of quantitative experiments in the field of physiology and pathophysiology." He adds, "Santorio was the first physician to conduct systematic measurements, with full consciousness of the importance of his procedure."

The second section of the monograph deals with his various mechanical contrivances designed to study human functions. The first, of course, was his human balance already mentioned. Because Santorio was the first to study physiological and pathological problems with quantitative methods, Professor Grmek points out that he must be regarded as "the founder of individual biometrics." He also introduced a clinical thermometer, but did not use it extensively for the study of clinical problems. He thought that temperature readings should be taken from the mouth in order to be comparable from one period of time to the next. His other devices were an hygrometer, the anemometer for measuring the humidity of the atmosphere, the pulsilogium for accurately recording the pulse, and the trocar which he used in abdominal and thoracic paracentesis and tracheotomy.

Part III of the monograph is made up of a series of excerpts from the writings of Santorio. The first is on the art of medicine, followed by a group of excerpts in which the original account is given of his various instruments including his pulse watch.

The final section comprises an exceedingly useful bibliography of the writings of Santorio, followed by a valuable list of secondary sources. Although Santorio began to publish in 1602, the book for which he is best known, *De statica medicina,* did not appear until 1614. The book is extremely rare, and Dr. Grmek, in a personal communication, states that he had been unable to locate a copy of the first edition in any Continental library. Thanks to the good offices of Dr. Dorothy Schullian, it has now been

ascertained that there is a copy in the Vatican Library, a photostat of which is now in the Historical Library at Yale.

MARY T. MARTIN SLOOP, with LEGETTE BLYTHE. *Miracle in the Hills.* McGraw-Hill, 1953, 232 pp. $3.50.

Reviewed by ROBERT J. T. JOY, *student editor of this Journal.*

THIS is a pleasant little story of a lady with the reformer's zeal and a will of iron. In 1908, Dr. Mary Martin married Dr. Eustace Sloop, and together they entered the Blue Ridge Mountain country of North Carolina to bring modern medicine to the mountain people. From that time to the present they succeeded in introducing modern farming methods, co-operative boarding schools, new roads, electricity, and in having a major share in abolishing "moonshining" and child marriages as well.

The book is largely the story of Dr. Mary's endeavors with her husband acting as a supporting hand. Most of the text is concerned with the fight to improve the lot of the people. There is little of interest to the purely medical historian. Dr. Mary found a proud, independent, poverty-stricken people when she arrived, but now, largely through her efforts, the region boasts fine schools, "cash crops," modern hospitals, and other benefits of civilization.

Of medical interest is her account of an early operation in a mountain cabin when a rooster leaped into the abdominal wound at a crucial point. The patient recovered. In those days it was the custom for the neighbors to gather around and watch the operation, commenting on the patient's chance for survival or the necessity for the operation. All the hazards of those days were not infectious! Surgery was done by preference out in the open air, especially under an apple tree, which seemed to have an "antiseptic" effect.

There are five pages of photographs of the country contrasting the appearance in the early 1900's with the present. The style is rather disjointed, an attempt being made to cast it in the form of a long conversation with Dr. Mary. There is no index. *Miracle in the Hills* will appeal mainly to the lay reader interested in early attempts to improve the lot of a backward and handicapped people.

WOLFRAM KOCK. *Kung. Serafimerlasarettet 1752-1952. En studie i svensk sjukvårdshistoria.* (Stockholm, 1952.) 453 pp., illus.

Reviewed by ADOLPH B. BENSON, *Professor Emeritus of German and Scandinavian, Yale University, New Haven, Connecticut.*

THIS is a history of the Seraphim Hospital in Stockholm, Sweden, a story of two centuries of medical care in the Swedish capital. But it is more than a series of dry, local reports since it covers more territory than the title implies and in measure concerns all Sweden with important connections with the rest of Europe and even with America. Intended for both professionals and laymen, the style and material of the volume will suit all readers interested.

Of course, there are descriptions of buildings and reconstructions at various periods, tables, statutes, statistics, and laws for those who need these; others can pass them by, though such informations as fees and general expenses through the twenty decades will prove of interest to most students of the development.

Written in the form of an academic dissertation, the history is naturally based on both published and unpublished sources, including letters and all manner of archives; it has pages and pages of footnotes that often are more interesting than the running text; it contains not only a large, authoritative bibliography, a list of occasional donors to the hospital, and an index of prominent persons, but also numerous illustrations, dozens of valuable biographies of notables connected with the institution, and a brief history of medical care in the civilized world, especially in Sweden, before 1752. It is an excellent reference work on the subject. Moreover, we are reminded of what we owe to the predecessors of the modern physicians and surgeons: the barbers, nuns, monks, alchemists, general quacks, and country pastors. Best of all—for non-Scandinavians with no knowledge of the Northern languages —is that the book contains (pp. 366-376) a synopsis of its contents in English. Incidentally, when the Royal Swedish Order of the Seraphim was established in 1748, it prescribed, among other provisions, that "knights of this order were in duty bound to exercise superintendance of hospitals and poorhouses, and members of the order were appointed to deal with the question of the prospective hospital"—hence the name (p. 367).

In the first chapters of our volume we learn that in Sweden surgeons were first incorporated "within the Barbers' association which, later, became the surgical Society"; that the medical association came into being in 1663; and that the first Swedish medical faculty was founded at Uppsala, where Johannes Chesnecopherus, in 1613, became the first professor of medicine. Because of poverty and epidemics sanitary conditions became very bad in Sewden at the beginning of the eighteenth century, "for which reason the Sanitary Commission, active 1737-1766, was appointed." The medical institutions in Sweden developed from the prehistoric "wayside lodgings," and in later years from monastic houses of the Holy Ghost and hospitals. The capital "got its first real hospital, Danvik Hospital, about the year 1557." A hospital for the acutely ill was erected in 1639 for the workers of the Falu copper mine, and in 1718 an institution was established at Uppsala for clinical instruction, the precursor of Serafimerlasarettet as a training hospital.

The Seraphim Hospital had a modest beginning of provisions for eight beds, with prospective patients coming from all of Sweden and Finland. Funds for the erection of the hospital were raised by voluntary contributions, a lottery, fees from well-to-do patients, entrance fees at the performance of plays, charges at sales of playing cards, admission fees at anatomies, church collections, etc. Later came definite governmental subventions. One of its primary functions, of course, was its training of nurses. Today, the Seraphim Hospital is working in close cooperation, as we understand it, with the

Caroline Hospital (Karolinska Institutet and Institute), which awards the Nobel Prize in Medicine. Definite plans for unification or division of functions as to training, clinics, and location have not yet been worked out.

SIR GORDON HOLMES. *The National Hospital, Queen Square, 1860-1948.* Edinburgh and London, E. & S. Livingstone Ltd., 1954. xi, 98 pp., 8 plates. 10/6.

Reviewed by JOHN F. FULTON, *Editor of this Journal.*

THIS is an admirable record of one of the most influential teaching hospitals in the English-speaking world, which was founded, as Sir Gordon's title indicates, in 1860, some ninety-four years ago. In his brief preface the author states that publication of such a history, which has no claim to age as do many London hospitals, "is justified not only by the quality of the work done, and the contributions to medical knowledge made therein, but also by the interest and affection it has aroused in those who worked there in any capacity or visited it." He adds, "One may claim that its influence on that branch of medicine with which it deals [neurology] has spread through most of the civilised world, wherever its students have carried its practice and teaching."

Holmes has based the record on hospital archives and on information which came to him from older members of the staff, and he mentions in particular Sir Ernest Gowers, Chairman of the Board of Management, son of Sir William Richard Gowers (1845-1915) who, after John Hughlings Jackson (1835-1911), was probably the most eminent neurologist associated with the Hospital.

Queen Square had early attracted British students in great numbers, but during the past fifty years there have also been increasing numbers from overseas. To them and to future generations who go to Queen Square for inspiration and guidance this history will be an especially welcome document.

Critical readers, and especially students, would have liked to hear much more about some of the great figures, particularly Gowers, and also Sir David Ferrier (1842-1928) in whose career primate experimentation and clinical study were most happily wed. In addition to its too great brevity, the book suffers from lack of an index.

NOTES ON CONTRIBUTORS

J. MENZIES CAMPBELL, D.D.S., F.R.S.M., who resides at 70 Great George Street, Glasgow W. 2, is author of *A dental bibliography, British and American, 1682-1880.*

DENIS I. DUVEEN, F.R.I.C., is an industrial chemist and book collector residing in New York City.

E. DVOICHENKO-MARKOV, Ph.D., is the author of "The American Philosophical Society and early Russian-American relations" published in the *Proceedings of the American Philosophical Society,* 1950, *94,* 549-610.

BRUNO KISCH, M.D., is Professor of Philosophy and History of Science, Yeshiva University, New York and Research Associate in Cardiology at Mount Sinai Hospital.

HERBERT S. KLICKSTEIN, M.D., has been a Fellow during 1953-54 at the Institute of the History of Medicine, Johns Hopkins University, Baltimore, Maryland.

CHAUNCEY D. LEAKE, M.D., is Executive Director, University of Texas—Medical Branch, Galveston, Texas.

IRVING MASSEY has been studying for his Ph.D. degree at Harvard University.

A. P. MEIKLEJOHN, M.D., is a member of the Department of Medicine, University of Edinburgh, Scotland.

JOSEPH H. PRATT, M.D., is director of the Pratt Diagnostic Clinic, New England Center Hospital, Boston, Massachusetts.

PHYLLIS ALLEN RICHMOND, Ph.D., resides at 284 Maplewood Avenue, Rochester, New York.

DOROTHY M. SCHULLIAN, Ph.D., is a Fulbright Fellow in Italy, 1953-54.